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BY

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EDITORIAL NOTICE.

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ARCHIVES OF OTOLOGY.

A CASE OF ACUTE MIDDLE EAR SUPPURATION,
COMPLICATED BY LABYRINTHINE FIS-
TULA AND PARALYSIS OF THE
ABDUCENS NERVE.

BY HILL HASTINGS, M. D.

LOS ANGELES, CAL.*

DIPLOPIA from paralysis of the abducens nerve, suddenly occurring after a mastoid operation, is a symptom of rarity and one that is apt to cause in the mind of the operator grave apprehension of an intra-cranial complication. In order to clear up the pathology of this extension of the middle ear suppuration Gradenigo¹ has investigated 19 cases, 6 of his own and 13 that have been reported by other otologists, 4 of the 13 having been recently reported at the May 1904 meeting of the French Society of Otology and Laryngology.² Since then another case of otitic paralysis of the Abducens has been reported by Ricci.³ It seems well, therefore, to present this case as a matter of record, especially as a fistula through the inner tympanic wall was demonstrated on re-operation as the probable avenue of extension of the infection. Gradenigo arrived at the conclusion that "this syndrome of clinical symptoms is the result of a circumscribed simple serous leptomeningitis localized about the tip of the pyramid and caused by the diffusion of the infection in the tympanum. In certain cases death resulted from the spread of the infection.

* Reported to the Los Angeles Eye and Ear Society.

¹ *Annals of Otology, Rhinology and Laryngology*, Dec. 1904.

² By Lannois and Ferrand, Lubet-Barbon and Cheval.

³ *Arch. Italiano di Otologia*, vol. xv, part 6, abstract in the ARCH. OF OTOLOGY. (Oct. 1905).

In our case the finding of the labyrinthine fistula was not anticipated. On the contrary the persistence of the copious middle ear discharge after the mastoid operation had led us to suspect a perforation of the tegmen tympani with the formation of an epidural abscess. When the tegmen tympani was found intact and the labyrinthine fistula discovered, the middle cranial fossa was not opened. That involvement of the abducens resulted from extension of the middle ear infection through the fistula in the oval window, by way of the labyrinth, to the dura at the tip of the petrous, seems probable by the subsidence of the paralysis after the secondary operation.

History.—A——W——, male, aged twenty-two years, was seen in consultation on January 17, 1905, on account of an acute ear trouble. One week before stuffiness, noises and pain began in the right ear, following a cold in the head of five or six days duration. He was admitted to the hospital with a temperature of 101° , slight mastoid tenderness, and some purulent discharge from the ear. Examination (three days later) showed moderate mastoid tenderness, chiefly over the antrum and tip and no œdema; a mucopurulent discharge from the middle ear; sagging of the postero-superior canal and an inflamed bulging drum membrane with a small insufficient perforation. The temperature was 99.2° , the hearing was poor; watch was not heard on contact. There was some tinnitus, but no dizziness, and no other symptoms. There had been no previous ear trouble. His general condition was good. Microscopical examination of the aural discharge showed the presence of diplococci.

A free incision was made in the drum membrane. The usual abortive measures were unavailing. Three days later a simple mastoid operation was performed.

Mastoid Operation.—A complete ablation of the cellular structure was done. The findings were of no special interest. There was pus in most of the cells including the tip cells, and in the antrum. The dura and sinus were not exposed.

After operation the discharge and pain in the ear continued and gradually increased, although the mastoid wound was clean and the aditus remained open. There was some dizziness and considerable tinnitus. The drum membrane remained beefy red and bulging and was incised on two or three occasions to secure better drainage from

the middle ear. The temperature ranged from 98° to 100.2° , and the pulse was about 88. This condition continued for 12 days. On the 12th day after operation the patient complained of considerable increase in the dizziness and of double vision, a symptom that he had not previously noticed and claimed never to have had before. Examination showed marked diplopia due to paralysis of the abducens nerve on the affected side. The fundus of the eye was found to be normal. The other ocular muscles responded normally. There were no other motor or sensory disturbances. No chills, vomiting or other symptoms occurred. The temperature was 98.6° , the pulse 78. The general condition was good, the mastoid wound clean and red; and there was nothing abnormal except the continuation of the middle ear discharge, deep-seated pain in the ear and some dizziness. The primary middle ear inflammation had been of only a few days' duration, and prior to this, the patient's hearing had been normal; so that a radical operation, which seemed indicated, was deferred. The paralysis persisted, the pain in the ear, radiating to the face, grew worse although the temperature remained practically normal, from 98° to 99° , pulse 68 to 88. On the 11th day after the appearance of the paralysis the typical radical operation was done.

Radical Operation.—The tympanic cavity was found full of granulations and pus; its mucous membrane was swollen; the malleus and incus were normal. When the cavity was cleaned out and dried, pus could be seen coming from the inner tympanic wall in the recess of the oval window—and apparently through that opening. The stapes unfortunately, was not found. It was likely broken and lost in the removal of the other ossicles. The fistula was probed and found to lead inward, apparently into the vestibule to a depth of about $\frac{1}{2}$ cm, before bony resistance was met with. Its opening was enlarged and the fistula swabbed with a solution of bichloride. There was no necrosis of any other portion of the tympanum. The tegmen antri and the tegmen tympani were intact; the inner table of bone of the middle cranial fossa was found hard and was not opened. A Ballance meatal flap was made and sutured above, and the post-auricular wound left open for subsequent treatment. Facial twitching occurred two or three times during the operation, due to injury to the horizontal portion of the facial canal, which formed the upper rim of the fistula.

The pain subsided after the operation. The paralysis of the ab-

ducens nerve gradually passed off; diplopia entirely disappeared in four weeks. Slight facial paralysis resulted from the operation, but passed off within a week. At the first few dressings, a drop or two of pus could be seen coming from the fistula. This was wiped out with an alcoholic solution of bichloride and a small wick of gauze inserted to maintain good drainage. The discharge ceased within a week. The dizziness passed off in three weeks. The tinnitus persisted. The temperature rose to 102° after operation, dropped in three days to 99° , and was normal thereafter. The middle ear cavity was grafted five weeks after the radical and the post-auricular wound closed. The grafts took only partially. The post-auricular wound healed by primary union, and a collodion strip was substituted for the bandage on the seventh day. On September 25, 1905, ($7\frac{1}{2}$ months after operation) examination notes were made as follows:

Patient returned after two months absence, reported he had been working steadily, has had no return of the double vision, or dizziness and no pain or discharge. He has not used any irrigation, but has kept up the alcoholic drops (15 drops alcohol-boric, b. i. d.) The tinnitus (slight hissing) has persisted. The post-auricular scar is firm; the middle ear cavity is dry, hard, white and glistening. The tympanic cavity proper is somewhat narrowed; a small opening anteriorly leads to the Eustachian tube, which is dry. The drops were discontinued and the patient reported three weeks later and discharged, healed.

Functional Examination (September 25, 1905).

AD (Affected ear) Weber, away from. Schwabach, plus. Watch, faintly heard on contact. Stage whisper, questionable, at twelve inches; conversation, questionable, at two feet. Forks by air conduction, faintly heard; high forks better than low.

REMARKS.

The case presented some peculiar features, as follows:

I. *The involvement of the internal ear early in the course of an acute suppurative otitis media.*—While this is rare, one observer, Hinsberg,* out of 89 cases of labyrinthine fistulæ, found that 18 occurred from acute otitis.

* "Suppuration of the Labyrinth," by Victor Hinsberg of Breslau. Translated by Richard Jordan, New York. ARCH. OF OTOTOLOGY, vol. xxxi.

II. *The avenue of extension of the middle ear infection.*—This was clearly through the oval window or the upper rim of the window. Unfortunately a fistula into the labyrinth was not suspected before operation and a careful examination was not made of this recess until pus was seen oozing through the window a drop at a time. The stapes had already been lost, likely in the removal of the malleus and incus and granulations.

III. *The cause of the abducens paralysis.*—That the extension of the infection to the nerve sheath came by way of the labyrinth seems probable by the rapid subsidence of the paralysis after good drainage of the labyrinth was established.

IV. *The prompt recovery after re-operation.*—It is noteworthy that it was not necessary to remove the inner tympanic wall and do a complete curettage of the internal ear. Good drainage was sufficient. It is equally noteworthy that the delay after the mastoid operation, before doing a radical was too long and fraught with grave danger. In the light of the operative findings the escape from meningitis was narrow.

The functional test showed very slight if any hearing in the affected ear, whisper and speech being questionable, though there was some response to the forks by air conduction; also in Weber's test hearing was referred to the normal ear; all of which was to be expected from the labyrinthine inflammation. However, and this was repeatedly tested, Schwabach's test was positive on the affected side, which is contrary to expectation and is inexplicable.

V. *The conclusion* seems reasonable that the occurrence of abducens paralysis in acute suppurative otitis media means an inward diffusion of the tympanic infection; and when accompanied by the syndrome of the ear symptoms above noted, operative rather than palliative measures should be applied to the tympanic cavity.

SEROUS MENINGITIS.*

By ARNOLD KNAPP, M. D.

THE diagnosis of otitic intracranial complications is often obscured by symptoms referable to increased brain pressure, and we are sometimes agreeably surprised by the happy outcome of an exceedingly grave condition after an operation which, except for the evacuation of an excessive amount of cerebro-spinal fluid, has been without result as far as discovering a lesion of the cerebral structures is concerned.

The following case illustrates this condition.

A. M., male, 18 years of age, had always enjoyed good health except for frequent colds which affected his hearing. Three weeks ago, after a cold, the left ear began to discharge. He also suffered from severe headache in the left half of the head and vomited. The left mastoid process became tender and swollen. These symptoms continued for one week and then abated with the exception of the headache and vomiting. He lost flesh, was constipated, and his sight began to fail one week ago. He had some fever; the pulse-rate was slow; he was languid and somewhat stuporous.

On admission, January 31, 1905, patient is sallow, thin, but fairly well-nourished. Answers questions correctly though slowly. No vertigo, but his gait is unsteady.

Ears: Right ear. Mt. intact; pink; canal normal. H=10/20. Mastoid region normal. There is some tenderness on percussing the skull directly up and back of the mastoid process. Left ear: Mt. retracted; H=20/20.

Eyes: Left pupil larger than right; both react to light. Marked optic neuritis. R. V=15/50. L. V=15/20. Visual fields normal.

Temperature, 99°; pulse, 120; which dropped to 60 within an hour.

*Read Before Section on Otology, New York Academy of Medicine, November 5, 1905.

The slow pulse, retarded cerebration, headache and optic neuritis, suggested increased brain pressure, and coming on after an attack of acute otitis, were presumably due to an intracranial extension. The fact that the conditions in the ear and mastoid had been mild and were now almost entirely recovered from, though the symptoms of an otitic intracranial extension seemed to be present, is unusual, though not at all unknown. As to the form of intracranial infection, meningitis and sinus thrombosis could be readily excluded; from the pressure-symptoms a brain abscess seemed most probable, though there were no focal symptoms. The presumable site of the brain abscess could be placed in the temporal lobe as the infection probably extended through the tegmen of the tympanum or of the antrum; affections of the posterior cranial fossa, that is of the cerebellum, being usually secondary to a labyrinth complication or a disease of the sinus. A labyrinth complication could be excluded from the good hearing present and by the absence of the so-called labyrinthine symptoms, vertigo and nystagmus. There were no febrile symptoms suggestive of a sinus involvement.

Operation January 31, 1905. Chloroform narcosis. The mastoid antrum and the tympanum were exposed as quickly as possible and found to contain swollen but healthy mucous membrane and no pus. The ossicles were healthy; the roof of the tympanum and antrum showed no defect. Nevertheless the tegmen was removed from the orifice of the tube back to the superior margin of the petrous pyramid. The dura over the temporal lobe was absolutely healthy and pulsated. The posterior segment of the mastoid process was then removed, in order to expose the sinus and the dura of the posterior cerebral fossa. At the upper posterior margin of the mastoid process the bone was found discolored and soft. After this was freely removed a large area of the dura and the lateral and sigmoid sinuses lay exposed. Corresponding to the region of affected bone, the dura directly above the knee of the sinus was thickened, discolored, bled freely, and was covered with apparently old granulations. A similar area of discolored dura was found over the sinus. The affected dura above the sinus was incised, and perfectly healthy brain exposed. The brain was punctured without result. The affected area over the sinus was next examined. The wall of the sinus was found very much thickened, but on opening into the lumen free hemorrhage took place. The bone was then removed down and back of the sinus to expose the cerebellum. The dura in this region was found perfectly normal. An incision

was made just posterior to the sinus and was followed by a gush of cerebro-spinal fluid. The incision was enlarged and kept open to facilitate the escape of liquor which continued in large quantities. The presenting cerebellum was normal.

The patient recovered well from the operation, and much to our surprise his improvement was immediate and continuous. The subsequent course was uneventful, though at the first dressing on February 6, 1905, the area of the dura which had been found discolored at operation had given way as if it were gangrenous, and the large defect was filled with infiltrated brain tissue. This was removed with a curette. The protruding area subsequently contracted and formed a circumscribed cerebral hernia of about the size of a walnut. Notwithstanding this incident, the symptoms were all relieved from the time of operation. The headache had totally disappeared. The boy's mental condition became much brighter. His pulse rose to 78 and his temperature was normal. The vision improved, and on March 25th it was normal in each eye. The improvement could be followed by observing with the ophthalmoscope the gradual retrogression of the optic neuritis. On March 30th, a plastic operation was done by which the cerebral hernia was covered.

We have in this case a train of symptoms suggestive of a severe intracranial affection, secondary to a pachymeningitis with gangrene of the dura induced by an otitis of the mastoid process after acute otitis. The eradication of the mastoid focus and the escape of large quantities of c. s. fluid were followed by the relief of all the symptoms, and led to the patient's recovery. In the light of our present knowledge we are forced to the diagnosis of serous meningitis.

Our knowledge of serous meningitis is still far from complete. Brieger* states that after it was found that increase of c. s. fluid causes a condition resembling meningitis which disappears on the evacuation of this fluid, aural cases where severe cerebral symptoms have been relieved by operations without result except for the evacuation of c. s. fluid, have also been classed as serous meningitis. There have been no autopsies; recovery is in fact a characteristic of the disease. Clinically the condition has been frequently observed, especially after otitic extradural abscesses and suppuration within

*Encyclopedie der Ohrenheilkunde, 1900, p. 478.

the labyrinth. The labyrinth as is well known communicates with the subarachnoid space by several channels.

I have also observed an example* of the latter variety which presented several interesting features.

In brief, it was a case of a girl, 16 years of age, suffering from chronic purulent otitis, caries of the labyrinth and numerous intracranial complications. Following the first operation the patient did perfectly well until one month later, when some granulations in depth of wound were curetted. She was suddenly taken ill on the same day with a chill, headache and vomiting. When readmitted to the hospital two days later, she was very restless. T. 104° F.; P. 100. Complained of severe headache and pain in the lower extremities and rectum, but the sensorium were unclouded. The head was drawn back and spine was rigid. The eyes were normal. Lumbar puncture evacuated a large amount of clouded fluid under pressure. The diagnosis of purulent meningitis was made and the condition was regarded as practically hopeless. This case recovered. It illustrates the early and chief involvement of the spinal cord in cases with previous labyrinth symptoms.

If we compare these two clinical pictures we find, in the first, symptoms due to increased intraventricular pressure, while in the second, the symptoms are those found in disease of the spinal meninges. It cannot be decided whether these two forms belong to the same morbid process, the difference in symptoms depending solely upon the varying localization.

According to Körner,¹ Merkens² has offered the most plausible explanation of this form of meningitis. He says that just as inflammatory or collateral œdema surrounds any purulent focus, caries or suppuration in the neighborhood of the dura will affect the meninges. The increase of c. s. fluid after certain infectious diseases, like typhoid or pneumonia, is well known. The extreme reactive susceptibility of the arachnoid or pia to toxins from inflammations in distant parts of the body, will be still more manifest if the original process occurs in their immediate vicinity. In middle ear suppuration and its

*The case was reported in the ARCHIVES OF OTOLOGY, vol. xxxiii, p. 478.

¹Körner. Die Otitischen Erkrankungen, etc. Third edition, 1902, p. 66.

²Merkens. *Deutsche Zeitschr. f. Chir.* vol. lix.

complications, toxins can easily penetrate to the meninges of the brain similar to an extension of collateral œdema. This serous toxic inflammation of the meninges then may lead to an internal hydrocephalus. A shutting off of the ventricles is presumably of frequent occurrence. The symptoms disappear after operative eradication of the otitic process, like the rapid diminution of inflammatory œdema after incision of a furuncle. The toxic action may also be extended to the underlying brain and the toxic encephalitis explains the focal symptoms, such as aphasia, paralysis, which are sometimes observed. Pathologically serous and purulent inflammations are but grades of the same process, at the same time it is not quite correct to say that a serous inflammation is but a milder form of inflammation than the purulent, as it frequently is but the early stage of the latter.

Körner* also draws attention to the interesting fact that the cases of serous meningitis which have been reported have been principally in youthful individuals. Seventy-five per cent. were under 25 years of age. Moreover, the severe cerebral symptoms occasionally observed in simple inflammation of the middle ear in children and in young people, are probably due to a toxic meningo-encephalitis.

As regards treatment, the symptoms due merely to the increased intracranial pressure would be relieved by a release of the c. s. fluid, but this is not all essential. The increased brain pressure is never so severe in these cases as to be fatal of itself, and the mere evacuation of fluid in view of the extremely rapid reaccumulation in the presence of an inflammatory process, is of but secondary moment. The main feature in the treatment is the eradication of the primary disease in or about the temporal bone.

* l. c., p. 12.

SOME RELATIONS IN THE BLOOD-SUPPLY OF
THE INNER EAR WHICH HAVE A PRACTI-
CAL BEARING ON THE CLINICAL
STUDY OF OTOTOLOGY.*

BY GEORGE E. SHAMBAUGH, M. D.

CHICAGO, ILL.

(*With Illustration on Text-Plate No. 1.*)

WHEN asked to discuss the blood-supply of the inner ear before this Society it occurred to me that it would be of interest to answer, in part at least, a question which is often asked by the practicing otologist. What application can be made by the otologist of a knowledge of the circulation in the labyrinth of the ear?

Our interest in the study of an anatomical question is primarily a scientific one, and our efforts are directed first of all to ascertain the scientific facts; still as practical otologists, we take naturally a keener interest in those anatomical facts which have a practical bearing on our clinical studies. The symptoms produced by an anaemia or a hyperaemia of the labyrinth, the symptoms set up by the rupture of a vessel or the obstruction of an artery by an embolus, all help to increase our interest in the distribution of the vascular supply of the labyrinth. In this paper an effort is made to avoid as far as possible the recital of anatomical details and to aim rather to discuss the more interesting points in the circulation of the inner ear, especially those which have a practical bearing on the clinical study of otology. The points of special

* Read before Otological Section, N. Y. Academy of Medicine, Nov. 9, 1905.

interest in the study of the blood-supply for the internal ear group themselves under the following headings:

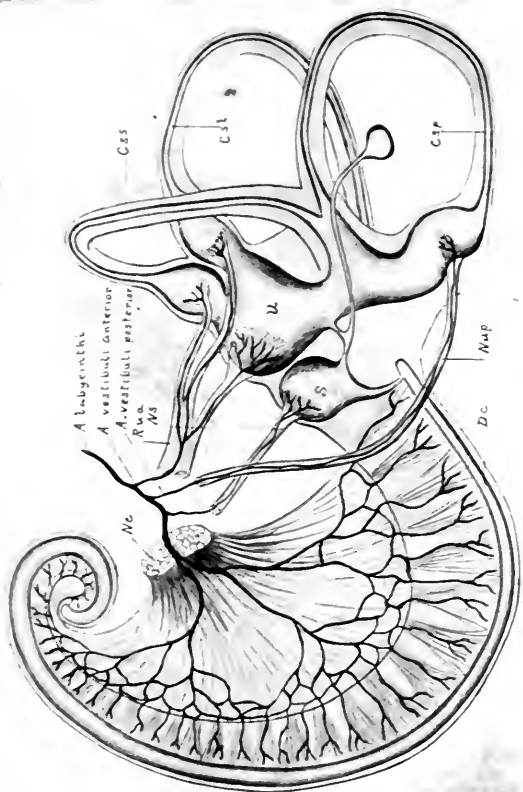
1. How is the arterial blood brought to the labyrinth.
2. How is the venous blood carried away from the labyrinth.
3. What is the distribution of the main arterial and venous trunks within the labyrinth especially in regard to their relation to the supply of the several areas in the labyrinth of highly specialized structures including the nerve endings.
4. What relation exists between the blood-supply of the membranous labyrinth and endosteum and the blood-supply of the bony shell or capsule of the labyrinth. Do the blood-vessels of the membranous labyrinth communicate with those in the tympanic cavity?

The arterial supply is brought to the internal ear through a single vessel, a branch of the basilar artery which enters the labyrinth along with the auditory nerve through the internal auditory meatus. The only exception to this arrangement that has been noted occurs as an anatomical variation in the labyrinth of the calf where I found that occasionally an artery penetrated the bony capsule at the distal end of the crus commune, and supplied the membranous semicircular canals in this region.

Regarding the manner in which the venous blood is carried away from the labyrinth there exists a diversity of opinion.

Siebenmann in his work on the blood-supply of the human ear describes three channels for the exit of venous blood from the labyrinth. The one, a vein in the internal meatus, drained the blood from part of the cochlea. The second, a vein which left the labyrinth along the aquæductus cochleæ, drained blood from the cochlea as well as from the vestibule. The third, a vein which left the labyrinth along the aquæductus vestibuli drained from the semicircular canals and the vestibule. This arrangement of veins leaving the labyrinth corresponds with the description given by Schwalbe. Eichler in his work on the blood-vessels of the human ear found but two routes by which the venous blood left the labyrinth, the vein of the aquæductus cochleæ and the vein of the aquæductus vestibuli. He found no vein in the internal meatus

ILLUSTRATING DR. SHAMBAUGH'S ARTICLE.



Nc. Nervus cochleæ.
Rua. Ramus utriculo-ampullaris.
Nap. Nervus ampullaris posterior.
Ns. Nervus sacculi.
U. Utriculus.

S. Sacculus.
Dc. Ductus cochlearis.
Css. Canalis semicircularis superior.
Csl. " " lateralis.
Csp. " " posterior.

which drained blood from the cochlea. In my own work on the blood-supply of the internal ear, which consists of a detail study of the blood-supply in the labyrinth of the pig, the sheep, and the calf, I found that a single vessel, the vein of the aquæductus cochleæ, drained the blood from the entire labyrinth. No vein was found in the internal meatus nor yet accompanying the aquæductus vestibuli which drained blood from the labyrinth. A single exception to this arrangement was found in the labyrinth of the calf where as an anatomical variation the vein of the crus commune was occasionally found leaving the labyrinth along the aquæductus vestibuli. This difference between the observation made by Siebenmann and my own can very readily be accounted for by variation in the different species studied.

A striking peculiarity in the blood-supply of the labyrinth is at once apparent that whereas the arterial supply is brought to the labyrinth by way of the internal meatus the venous blood leaves the labyrinth, at least for the most part, at a point distinct and separate from this, namely, along the aquæductus cochleæ.

As regards the distribution of the main branches of the labyrinthine artery within the labyrinth there exists a general uniformity of plan. My own observations on this point correspond closely with the results obtained by Siebenmann. Considerable practical interest attaches itself to the distribution of these vessels which fill the role of terminal arteries carrying the sole blood-supply to definite distinct areas in the labyrinth, for, with the knowledge of the areas supplied by these several branches of the labyrinthine artery, we have a key which in the study of the symptoms resulting from rupture of one of these vessels or the lodgment of an embolus in this or that branch may help in the closer study of the function of the several parts of the internal ear about which we are still so much in the dark.

The first branch of the labyrinthine artery is a large trunk which follows the course and distribution of the branch of the auditory nerve called the ramus utriculo-ampullaris. This artery is the sole supply for the macula acoustica utriculi and

the ampullæ of the horizontal and the superior semicircular canals.

The second branch of the labyrinthine artery like the first goes to supply the vestibule. Its distribution is the same as that of the ramus ampullaris posterior of the auditory nerve. It carries the sole arterial supply to the ampulla of the posterior semicircular canal. Branches from this artery supply also the posterior crura of the posterior and the horizontal semicircular canals and the crus commune.

These first two branches of the labyrinthine artery supply the entire vestibule and semicircular canals with the exception of the saccule. This structure has again a distinct and separate arterial supply through one or several branches which leave the labyrinthine artery at the base of the cochlea.

For obvious clinical reasons the question of the arterial supply of the cochlea is one of great interest. What disposition is made of the labyrinthine artery as it enters the cochlea? How are the several parts of the cochlea supplied, are distinct areas in the cochlea supplied as we found in the vestibule by terminal arteries? These questions are of special interest because of the accepted view regarding the function of the cochlea that the perception for the different tones is located in definite and distinct areas, the higher tones near the beginning of the basal coil and the lower tones toward the apex of the cochlea.

The labyrinthine artery while still in the bottom of the internal meatus after the branches which go to supply the vestibule are given off, breaks up into a number of branches before it enters the cochlea. The total number of these branches varies in different species. These several branches are connected with each other by a series of anastomotic loops before any of the terminal branches are given off to the several parts of the cochlea. The number of these anastomotic loops varies again with the different species. They were found most pronounced in the ear of the calf and least in the ear of the sheep. This arrangement of anastomotic loops or arcades between the several branches of the labyrinthine artery at the base of the cochlea constitutes an admirable protection against

injury resulting from occlusion by an embolus or a rupture of any one of these vessels. The part of the cochlea where this protection is least developed is in the terminal coil. This coil of the cochlea is supplied by a terminal artery. The anastomotic loops between the several branches of the arteries of the cochlea are lodged in the modiolus near the base of the lamina spiralis ossea, and follow the spiral direction of the coils of the cochlea. This area has received the name of *tractus spiralis arteriosus*. From the vessels in this area two sets of terminal arteries are given off. One set runs out along the lamina spiralis to supply the organ of Corti, the other set arches over the scala vestibuli and supplies the *ligamentum spirale*. This arrangement of the arterial tree of the cochlea provides that an injury through disturbance in the circulation is not likely to involve any considerable area of the cochlea on account of the collateral circulation provided by the anastomotic loops between the several branches which supply the cochlea, an exception being the terminal coil which is provided with a terminal artery not anastomosing with the other vessels. On the other hand the organ of Corti throughout its entire extent as well as the *ligamentum spirale* is supplied by terminal arteries each one of which is distributed to a distinct though small area.

A study of the disposition of the several branches of the labyrinthine artery brings out the fact that the several parts of the labyrinth are supplied through terminal arteries. The areas that are in this manner isolated by their arterial supply from the rest of the labyrinth are as follows :

1. The utricle together with the horizontal and superior semicircular canals. These are supplied through the first branch of the labyrinthine artery.
2. The ampulla of the posterior semicircular canal, supplied entirely through the second branch of the labyrinthine artery.
3. The saccule, supplied by several arterial branches distinct from the remainder of the vestibule.
4. The cochlea, supplied as a whole by branches which are distinct from those that go to supply the vestibule and semicircular canals, while the several parts of the organ of Corti

throughout the coils of the cochlea are supplied by terminal arteries which isolate distinct though small areas from the adjoining parts.

That these facts can be utilized in a closer clinical study of cases where a disturbance in the blood-supply of the labyrinth has occurred I believe there is little doubt. The occurrence of a typical case of Menière's disease where there is a profound disturbance in the vestibule and semicircular canals as evidenced by the occurrence of vertigo and nausea, as well as a profound disturbance in the cochlea, as shown by the occurrence of severe tinnitus and deafness, can be brought about only by some disturbance in the circulation of the entire labyrinth. The report of cases of this sort is not uncommon. Not enough attention has been given to the fact that disturbance in the circulation of the labyrinth may be limited to one or several of the terminal arteries supplying certain areas without involving the remainder of the labyrinth. Such a disturbance in the circulation of the inner ear would not result in producing the typical Menière's symptom-complex. For example, the lodging of an embolus in the anterior vestibular artery would result in disturbance limited to the utricle and the horizontal and superior semicircular canals. The rupture of the posterior vestibular artery would cause disturbance limited to the posterior semicircular canal. The occurrence of disturbance in either one or both of these vessels would result in the production of disturbance of equilibrium without molesting the function of hearing. On the other hand a disturbance in the circulation may be limited to the cochlea without involving the vestibule or semicircular canals. Such a lesion would produce tinnitus and deafness, but not disturbance in equilibrium. Again an embolus lodging in the terminal artery which supplies the apical coil of the cochlea would perhaps cause deafness for the lowest tones without disturbing the upper part of the scale. Minute hemorrhage may occur from any of the terminal arteries that run out along the lamina spiralis to the organ of Corti, producing disturbance of hearing for certain tones without affecting the remainder of the scale.

There exists in the blood-supply for the organ of Corti an interesting arrangement of the vessels which in a large measure provides against too great a disturbance occurring in any particular area through the shutting off of the terminal artery supplying this area. This arrangement consists of one and often two spiral vessels lying directly under the organ of Corti. The outer one of these vessels is placed directly under the tunnel of Corti. Schwalbe described these spiral vessels as beginning at the lower end of the basal coil and running the entire length of the cochlea to terminate at its apex. In reality these so-called spiral vessels are but the elongated capillary loops formed from the outer series of capillaries given off from the vessels which radiate out along the lamina spiralis. They are connected with each of the many terminal arteries radiating out along the lamina spiralis to supply the organ of Corti. In the event of the blocking up or the rupture of one of these terminal arteries these spiral vessels are able, at least in a measure, to keep up the blood supply for the area of the organ of Corti thus affected.

One should not expect the clinical symptoms resulting from disturbances occurring in this or that branch of the labyrinthine artery to be capable of producing a too sharply defined clinical picture outlining the area involved. In the first place our knowledge of the function of several parts of the labyrinth is not exact enough to permit of a too accurate location of the area involved from the study of the symptoms produced, and in the second place in cases presenting a profound disturbance in the circulation of the vestibule and semicircular canals it is rational to expect at least a more or less marked temporary disturbance of the function of the cochlea. In a similar way a profound disturbance in the circulation of the cochlea would probably produce a temporary disturbance of the function of the remainder of the labyrinth.

The venous trunks of the labyrinth follow closely the distribution of the main arteries with the difference already referred to that instead of leaving the labyrinth at the point where the arteries enter, through the internal meatus, they all leave the labyrinth, at least in the species studied by me, along the aquæductus cochleæ.

The fourth question in the circulation of the labyrinth that has an important clinical bearing in the relation existing between the blood-vessels which supply the membranous labyrinth and endosteum, that is the ramifications of the labyrinthine artery, and those that are found in the osseous capsule surrounding the labyrinth.

It is a well known fact that the blood-vessels supplying the structures about the labyrinth communicate freely with those found in its bony capsule; the blood-vessels of the mucosa lining the tympanum send branches into the bony wall of the promontory; blood-vessels from the dura penetrate the area between the semicircular canals at the fossa sub-arcuata; and the blood-vessels of the temporal bone surrounding the labyrinth communicate freely with those of the capsule.

The question is whether the ramifications of the labyrinthine artery which supply the endosteum of the labyrinth penetrate the bony capsule. Since the blood-vessels of the periosteum are known to supply the underlying bone, we would expect perhaps to find the blood-vessels of the endosteum lining the cavities of the labyrinth also supplying the surrounding bony capsule. This view has found expression through Politzer, who believed he could demonstrate communications between the blood-vessels of the mucosa of the cavum tympani and those found in the membranous labyrinth and endosteum. The opposite view was first expressed by Hyrtl, who held that the blood-vessels of the inner ear from the time the artery enters the labyrinth at the bottom of the internal meatus until the veins leave the labyrinth, form a closed system, which at no point communicate with the blood-vessels of the surrounding structures. This latter view is the one adhered to. Recently Alexander, of Vienna, reported the presence of communications between the blood-vessels of the middle and the internal ear. I have made a study of the problem in the ear of the calf and was able to demonstrate that the branches of the labyrinthine artery supplying the endosteum penetrate the bony capsule at a number of distinct points, chiefly about the base of the cochlea and about the vestibule, and that in the ear of the calf at least communications apparently do ex-

ist between the blood-vessels of the mucosa of the cavum tympani and those of the membranous labyrinth and endosteum.

The existence of such communications between the blood-supply of the labyrinth and that of its bony capsule may be of considerable clinical importance. In the first place in the condition known as otosclerosis where a change in the ivory-like bone of the capsule to spongy bone takes place, communications between the blood-supply of the capsule and the internal ear might result in a more or less pronounced alteration in the circulation of the inner ear, such as might account for the tinnitus which is such a constant symptom of this condition. In the second place if communications exist between the blood-supply of the tympanum and that of the inner ear this condition may have a far reaching clinical significance not alone in connection with the suppurative processes in the tympanum but in the catarrhal processes as well.

INFECTIVE SINUS THROMBOSIS :

A DISCUSSION OF CERTAIN VIEWS RECENTLY ADVANCED.*

By PHILIP D. KERRISON, M. D.

NEW YORK.

(With One Illustration on Text-Plate II.)

IN the last issue of the ARCHIVES OF OTOLGY (October, 1905) appeared a very interesting monograph on infective sigmoid-sinus thrombosis, by Dr. John D. Richards, of New York.

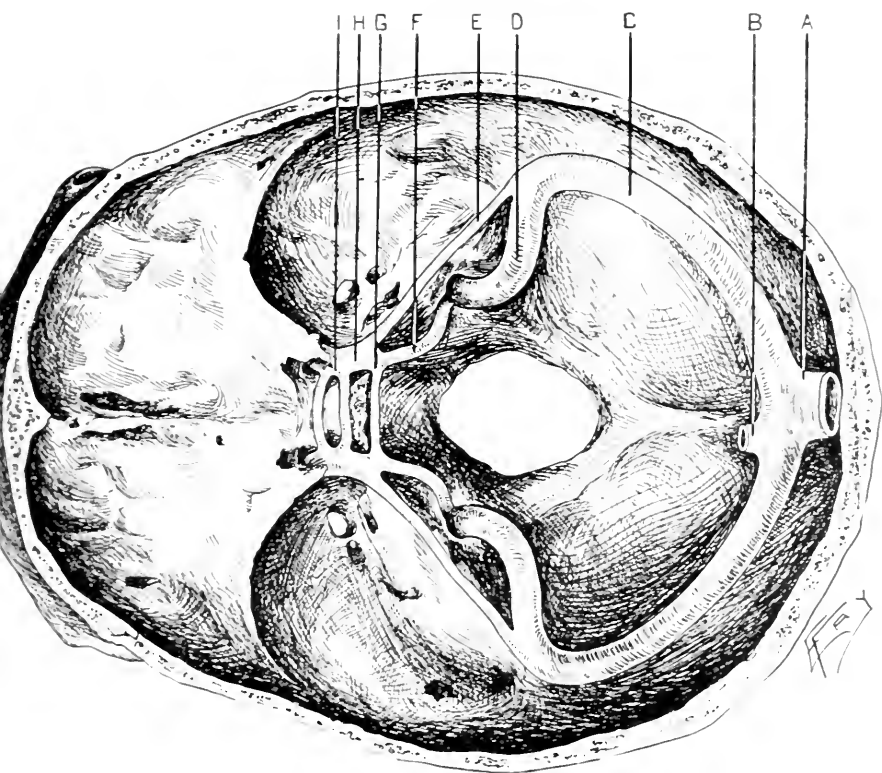
The writer calls our attention to the formidable character of the disease ; and to the fact that the symptoms (*i. e.* those characteristic of septic absorption) are indicative not of clot formation, but of a later stage in which the thrombosis, having become infected, undergoes disintegration, septic particles being conveyed by the venous current to the right side of the heart. This, of course, is the only correct view, and one which no one will question.

Basing his remarks upon forty-four cases of infective sinus thrombosis which he has had an opportunity personally to observe and follow (of which, however, no details are given), the writer gives several suggestions as to operative technique, choice of instruments, etc., which are well worthy of consideration. He then proceeds to state and elaborate certain views, to discuss which is my purpose in presenting this paper.

The question proposed for discussion by Dr. Richards is simply this : Shall we expose and lay open the lateral sinus

*Read before the Otological Section of the New York Academy of Medicine, on December 14, 1905.

CRANIAL BLOOD SINUSES.
To Illustrate Dr. Kerrison's Article.



- A. Torcular Herophili.
- B. Straight Sinus.
- C. Lateral Sinus.
- D. Sigmoid Sinus.
- E. Superior Petrosal Sinus.

- F. Inferior Petrosal Sinus.
- G. Transverse Sinus.
- H. Cavernous Sinus.
- I. Circular Sinus.

in all cases of acute or chronic mastoiditis, in which we have reason to suspect the existence of a thrombus? or shall we resort to this procedure only in the presence of symptoms or physical signs making such a diagnosis reasonably sure? His own views in the matter are expressed as follows:

(a) "If during mastoid operation we expose a sinus which upon careful examination seems suspicious, we should open the vessel *regardless* of the lack of symptoms;" and again:

(b) "When operating upon cases of mastoiditis in which symptoms of septic absorption pointing to sinus thrombosis are present, we will find it conservative practice to open the vessel, *regardless of its appearance, of its feel or of its pulsation.*"

Before discussing the first proposition,—viz., that one should open all sinuses suspected of containing thrombi, regardless of the presence or absence of symptoms,—one involuntarily asks upon what gross pathological changes in the vessel wall one should consider oneself justified in suspecting the presence of a clot. Let us see what the writer says of the diagnostic value of (a) color, (b) pulsation, (c) granulations and increased rigidity:

(a) *Color*.—"There are some who lay such stress upon discoloration of the sinus as to look upon it as an index of the condition within the vein, but of all factors of diagnostic value it is the most fickle."

(b) *Pulsation of the sinus wall*.—"Pulsation of a vessel wall, or absence of pulsation, is of little value in diagnosis."

(c) *Granulations and increased rigidity*.—"A parietal clot may be present which eludes detection. If granulations invest the vessel it is generally impossible to determine whether the resistance encountered upon palpation is due to a thrombus within, or to a thickened vessel wall and the granulation without. A positive diagnosis is rarely made before the sinus is opened. If after a careful examination of the vessel (taking into consideration its appearance, feel, color, etc.), *we are in doubt* as to the presence of a thrombus, the vein should be opened regardless of the lack of symptoms."

The above are not sentences carefully selected among

many. *They are practically all* that is said as to the physical changes which should lead one to suspect the existence of a clot. Apparently, then, a thickened sinus wall covered with granulations represents the condition which should be regarded as pointing most strongly to the possibility of a thrombus.

This view hardly seems to be based upon a proper interpretation of the pathological processes involved. Granulations do not form upon normal tissue. Their presence upon the dura forming the outer coat of the sinus is evidence of inflammatory changes involving at least the outer coats of the vessel. Such inflammatory changes must, therefore, necessarily mean thickening and increased resistance to pressure in that portion of the sinus wall covered by granulations. It does not necessarily follow, however, that the inner coat of the vessel is involved in inflammatory process; and in the vast majority of cases there is reason to believe that such involvement does not take place. In the presence of granulations, therefore, the vessel wall must be thickened, and must offer increased resistance to the palpating finger. In cases of extensive mastoid necrosis, involving the bony covering of the lateral sinus, a thickened sinus wall, covered with granulations, is by no means uncommon. That the great majority of such cases recover promptly after all diseased bone has been removed, is a fact that will be questioned by few surgeons whose experience in mastoid surgery has been considerable. As to the question of opening such a vessel for the purpose of determining the presence or absence of a beginning parietal clot, I feel very strongly that such a procedure,—in the absence of symptoms,—is not only inadvisable, but absolutely at variance with all sound surgical principles. That the formation of granulation tissue may represent either disease, or a phase of reparative inflammation,—the new connective tissue being conservative and protective,—is a fact long since generally recognized. As types of lesions in which this process represents a necessary stage of repair may be mentioned wounds with loss of substance and serous membranes which in the course of an acute exudative inflammation have been

denuded of their endothelial covering. Arguing an analogy between the granulations covering an inflamed dura and those lining an inflamed serous membrane (*e. g.*, the peritoneum in a localized appendicitis abscess), let us follow, if we can, the gross pathological changes which probably lead up to the thickened, granulation-covered dura which all of us have seen covering the outer wall of the sinus in cases of extensive mastoid necrosis. Let us suppose a case in which not only the intercellular bone substance, but also the bony wall of the sinus groove has undergone necrosis. The dura covering the sinus is now in contact with carious bone or separated from it only by fluid pus. The outer coat of the vessel (*i. e.*, the dura) soon undergoes changes, changes characteristic of an acute exudative inflammation; *i. e.*, first, dilatation of the blood vessels and subsequent retardation of the blood current; next, transudation of serum and emigration of leucocytes from the veins into the surrounding tissues. Unless quickly relieved, there is a proliferation of new cells, and the surface layer of endothelial cells undergoes necrosis. Upon this denuded surface granulations soon form. The vessel wall is now thickened by the products of an acute exudative inflammation, *but from further infection it is guarded by a protective layer of granulations*. Removing from contact with these granulations all necrotic and diseased tissues, we pave the way in the vast majority of cases for a safe and fairly rapid recovery. Incising the vessel wall, we at once admit to contact with its inner coat,—perhaps in a state of simple congestion,—and to the cut surface, the germs which are inseparable from granulations which have been bathed in pus. Shall we open this vessel on account of its increased rigidity and covering of granulations in a patient presenting no symptoms of sepsis? Again I wish to record my conviction that such a procedure would be in contempt of all recognized surgical principles.

As to the method to be employed in exploring a suspected sinus, the writer lays much stress on the importance of making a sufficiently free incision to examine thoroughly the interior of the vein. He says: "When only a sufficient opening in the vessel is made to allow the introduction and manipulation

of a curette, and the vessel is not slit widely open throughout the entire length of involvement, so that we can see the condition of its interior, any fistulous tract leading into the subdural space," etc., may be overlooked. But what if we find no clot? I have searched in vain for any statement as to the writer's views on this point. Obviously, to coaptate the edges of the wound would be to invite sepsis. The mastoid wound, in spite of any effort we may make at sterilization, is a pus cavity which now communicates by an extensive opening with the interior of the sinus. Clearly but one course is open to us,—viz., obliteration of the sinus throughout the entire extent of the incision. But can we be sure that we have not sown the seeds of a septic thrombus lower down? Has the information we have obtained justified the risks incurred? Would the possible early discovery of a clot in isolated cases justify the risks to which the many would be unnecessarily exposed were the writer's views generally accepted? The writer tells us that we should open freely all sinuses which are suspected of containing thrombi, but makes no statement as to the physical changes in the vessel wall which would justify this suspicion. He prescribes radical prophylactic measures against problematic sepsis, but gives no indications therefor.

SYMPTOMS OF SEPTIC ABSORPTION AS AN INDICATION FOR OPENING
THE SINUS.

Let us return now to the second proposition,—viz., that in the presence of symptoms characteristic of septic absorption, we should open the sinus in spite of the absence of demonstrable changes in the vessel wall. Undoubtedly there are cases in which symptoms of sepsis, which can be traced to no other cause, may not only justify but demand exploration of the sinus. It must be remembered, however, that the symptoms associated with sinus thrombosis are simply those of periodic septic absorption. They are not pathognomonic of any one lesion, nor do they constitute a symptom-complex intended by nature—even during severe mastoiditis—for the exclusive use of the otologist. It hardly seems safe, therefore, to formulate any dogmatic or invariable rules for the management of such cases.

The statement that the sinus should be opened in all cases in which characteristic symptoms cannot otherwise be accounted for, is too sweeping. It altogether ignores the varying powers of observation displayed by many technically competent surgeons; and fails to take into account the many recorded cases, and still more numerous cases seen but not recorded, in which pyæmic symptoms, occurring during severe mastoiditis, have ultimately to be ascribed to undiscovered intercurrent disease, or pass without surgical intervention, and in passing carry with them the secret of their causation. It makes no allowance for variations in the age of the patient, and ignores the fact that in young children such symptoms not infrequently result from absorption from the mastoid lesion proper, no involvement of the sinus having occurred. I have in my own operative experience seen several cases in which symptoms quite typical of intra-sinuous infection have disappeared completely after the removal of all diseased bone.

In regard to the method of exploring the sinus in these cases the writer says: "In those instances in which symptoms of sinus thrombosis are present, in which after opening the sinus we find it uninvolved, and being unable to account upon other grounds for the symptoms present, we should expose sufficient of the sinus *to allow the exploration of both jugular bulb and superior petrosal sinus.*" Again, supposing that no evidence of disease is found, how shall the surgeon proceed? This important point is not covered by the writer's paper. Obviously, complete obliteration of the sinus is the one theoretically safe method of completing the writer's exploratory operation.

I do not wish to be understood as denying the wisdom of opening the sinus in certain cases upon the symptoms alone. That we are sometimes called upon to assume this risk in the hope of saving life, is a fact generally conceded. I do believe, however, that there are many cases in which the exposure of a fair expanse of healthy sinus wall, by removal of the overlying bone, will justify the surgeon in pausing before further surgical intervention. The wisdom of such delay can be decided by no rule of thumb. Whether after exposure of the

sinus the surgeon shall proceed at once to explore the interior of the vessel is a question which should be decided only after careful weighing of all the data at hand,—*e. g.*, the patient's age, history, history of the attack, present condition, duration of symptoms, etc., etc.

To epitomize,— I believe (1) that the sinus should be opened only in the presence of symptoms or physical signs pointing fairly definitely to intra-sinuous involvement; and (2) that to advise opening the sinus in spite of the absence of symptoms in all cases in which the surgeon suspects the existence of a clot, without any definite statement as to the physical signs justifying such a suspicion, is an inexact and unscientific method of expression which should not find place in otological literature.

An interesting part of Dr. Richards' paper is that which deals with the forces influencing the blood current in the jugular bulb. The aspiratory influence of inspiration upon the blood in the jugular bulb and its bearing upon the dissemination of septic emboli is very clearly brought out. The attempt to analyze forces acting separately upon the two vessels which unite to form the internal jugular vein is not quite so convincing. When either the sigmoid or the inferior petrosal sinus becomes obstructed, it is clear that the current in the vessel which remains patent must be accelerated. But that the position and direction of the inferior petrosal are such as to favor aspiration of septic matter from the bulb into the jugular current during operation, there is reason to doubt. Dr. Richards devotes considerable space to proving that "the blood stream in the inferior petrosal sinus is in all probability a particularly swift current, having a more rapid flow than the current of the sigmoid sinus." In support of this proposition he says:

(1) "In direction it represents the continuation of the internal jugular vein, and the mouth of the sinus is aimed directly at the opening of the jugular, so that the inferior petrosal pours its blood stream directly at the orifice of that vessel.

(2) "Whatever the aspiratory influence may be, it propor-

tionately is exerted to a greater extent upon the inferior petrosal sinus than upon the sigmoid; for the sigmoid is somewhat protected from aspiration by its varying curves, by its right-angled position to the jugular vein, and by reason of the fact that the jugular bulb is on a higher horizontal level than the horizontal limb of the sigmoid sinus." "The arrangement of the inferior petrosal sinus, however, instead of suggesting a provision against aspiration, suggests the contrary. A short, wide, straight and incompressible vessel, *on a higher level than the jugular bulb, with a sharp declivity*, placed in direct line of aspiration," etc., would seem to suggest that the inferior petrosal exerts a controlling influence upon the blood current in the intra cranial sinuses.

A little reflection and dissecting-room study will convince us that the above statements, so far as the peculiarities of the inferior petrosal may influence aspiration during the course of an operation for sinus thrombosis, are misleading. Let us review the points made in the order in which they are advanced:

(1) That the inferior petrosal sinus *in direction* represents the continuation of the internal jugular; if this is intended to convey the idea that the general direction of the inferior petrosal is even approximately that of the internal jugular vein, the impression received is hardly in accordance with the facts. The general direction of the inferior petrosal forms with that of the internal jugular vein an angle varying in different skulls from 90 to 100 degrees; for while the direction of the inferior petrosal is outward, downward and backward, the vein is directed strongly forward, bringing the axis of their currents into a position nearly at right angles with each other.

(2) As to the influence of gravity;—*i. e.*, that the direction of the inferior petrosal represents a sharp declivity; that the jugular bulb is on a lower level than the inferior petrosal (whereas it is on a higher level than the horizontal limb of the sigmoid sinus):—with the patient in the position for operation, —*i. e.*, in the horizontal position with the head turned to the side opposite the lesion,—most of these conditions are absolutely reversed. For the direction of the current in the inferior petrosal is now upward (*i. e.*, against gravity), and the

blood stream must enter the bulb at a still higher level (see illustration). In the operating position, therefore, the above conditions more than offset any obstructing influence which the varying curves of the sigmoid may exert upon the current in the lateral sinus; for the stream in that vessel now flows downward,—*i. e.* with gravity,—toward the jugular forward. The peculiarities of the inferior petrosal sinus,—so far as they might have any theoretic influence,—would tend during operation to retard the blood current through it into the jugular bulb, and to this extent their influence would be against aspiration.

If we may regard the whole system of intracranial sinuses as a system of communicating compartments,—*i. e.*, as one irregular vessel; and if we will bear in mind the fact that the contained blood is kept in motion chiefly through the agency of pressure from the incoming blood from the cerebral veins, it becomes evident that the blood flow in the various sinuses cannot differ greatly except as it may be influenced by the distribution of these veins.

In physiological experiments intracranial pressure is usually measured by determining the pressure of the cerebro-spinal fluid in the subarachnoid space, or in the ventricles of the brain. This pressure varies in health only with variations in the amount of blood passing through the cerebral arteries. Owing to the physical conditions surrounding the brain,—*i. e.*, brain substance suspended in incompressible cerebro-spinal fluid, the whole being confined in the unyielding bony cavity of the skull,—any dilatation of the cerebral arteries must result in increased pressure upon the cerebro-spinal fluid and also upon the cerebral veins and sinuses. Howell, in his recently published text-book of physiology, states that it has been proved experimentally that the pressure in the subarachnoid space (cerebro-spinal fluid) is always the same as the venous pressure within the sinuses. If we may assume from this that the pressure within the various intracranial sinuses is uniform, I see no reason why the movements of the blood in these sinuses should not be in accordance with Pascal's physical law,—*viz.*, that pressure exerted upon any given area of a fluid enclosed in a rigid vessel is transmitted

undiminished to every equal area within that vessel, and therefore in all directions. This should tend largely, if not wholly, to eliminate gravity as influencing current rapidity in the venous sinuses of the skull.

To my mind, a question of greater importance in connection with intracranial surgery is the controlling influence which the various intracranial sinuses may exert upon the health of the individual. While this consideration should not deter us from operations necessary to save life, it certainly should weigh heavily against operative procedures for which no positive or clearly defined indications exist.

Dr. Richards says,—“It is not a little surprising that after complete obliteration of the internal jugular, the sigmoid and lateral sinuses of the involved side, no ill results follow which can be attributed to disturbed circulation.” But is this wholly or invariably true? Rohrbach has recorded a case in which, after ligating the internal jugular in an operation for removal of a tumor, the patient rapidly became comatose and died from cerebral œdema. Luc has reported a case in which, after ligation of the internal jugular, the patient gradually became drowsy, and died in eight hours, apparently from the same cause. Physiological experiments have shown that a dog may live and apparently thrive after removal of one kidney. But does he live as long? Who is prepared to say that obliteration of one of the large venous channels of the brain may not eventuate in grave sensory disturbances of which the surgeon may never know?—that the compensatory activity of the remaining sinuses and the increased strain upon the cerebral arteries may not give rise to retrograde tissue changes which, though not immediately fatal, may materially shorten, or curtail the usefulness of, the patient's life?

But to return to the original question,—shall we open all sinuses in which we have reason to suspect the existence of a parietal clot? My own convictions,—if they have not already been made clear,—may be stated briefly as follows:

1. In operating upon a patient suffering from acute or chronic mastoiditis, who presents symptoms characteristic of sinus thrombosis (*e. g.*, chills, high remittent temperature, sweats, etc.), the lateral sinus should at once be freely exposed

by removal of the overlying bone for at least three-fourths of an inch. This procedure in competent hands adds absolutely no risks to the operation, and permits an examination of that portion of the sinus nearest the original focus of infection. If the sinus is compressible, and the dura covering it is apparently healthy, one should hesitate before proceeding at once to open the vessel. Its free exposure places the surgeon in a position to act quickly should the further course of the disease so indicate. In many cases the symptoms will subside as a result of removal of all diseased bone.

2. Should symptoms of septic absorption develop in the post-operative period following mastoidectomy, the indications are the same,—*i. e.*, free exposure and careful examination of the sinus. If the sinus is apparently healthy, the question of a further delay should be carefully weighed, and decided only after due consideration of all the data at hand. It is of great importance at this juncture that the patient should be given the advantage of a consultation. Typhoid fever, malaria, pneumonia, tuberculosis and probably other conditions may in exceptional cases give rise to symptoms very similar to those characteristic of sinus thrombosis. Conditions overlooked by the surgeon may be quite patent to the skilled diagnostician whose professional activities cover a larger field. If the symptoms do not subside, there will be time to open the sinus after other causative factors have been excluded. Should a fatal outcome seem in certain cases to argue the penalty of delay, this should be accepted as the tribute which the individual must pay for the safety of the many.

3. In operating upon cases of extensive mastoid necrosis, one not infrequently finds the sinus groove diseased, and the sinus wall thickened and covered with granulations. In the absence of symptoms of sepsis, *this condition should be regarded as a positive contra-indication to opening the sinus. The granulations should not be curetted. The sinus wall should not be subjected to any unnecessary manipulation.* Great care should be observed to remove every vestige of diseased bone, areas of necrosis being followed in whatever directions they may lead. The great majority of these cases recover without any further operative intervention.

REPORT OF THE TRANSACTIONS OF THE NEW YORK OTOLOGICAL SOCIETY.

MEETING OF NOVEMBER 28, 1905. DR. E. B. DENCH, THE PRESIDENT, IN THE CHAIR.

BY DR. ARNOLD KNAPP, SECRETARY.

DR. PHILLIPS presented a patient **with closure of a large retro-auricular opening** by the so-called radical operation and a particular meatoplasty. The patient's ear trouble began four years ago, was characterized by rapid extension and at the operation, which was undertaken four days later, considerable disintegration of the bone had occurred. A second operation was necessary in which the zygomatic cells were radically resected and the middle cranial fossa exposed. Notwithstanding a number of small operations, the wound never completely healed. There was a very large hole in the mastoid which was covered by healthy epithelium in its lower half. The radical operation was performed and this lower epidermised portion of the mastoid was left alone. An incision was made along the margin of the opening and the two skin surfaces were then approximated, covering over the large bony cavity. The following meatoplasty was performed. An incision was made along the inferior portion of the entire canal into the concha; this was continuous with a broad circular incision in the concha whereby a circular flap was obtained which was reflected backwards. As far as the author knows, this meatoplasty is the method described by Ballance. He had been in the habit of practising this procedure with perfect satisfaction.

The results seemed to be better from a cosmetic standpoint than in other procedures. The hearing is now very much improved.

Discussion: Dr. BERENS thought it was extremely important in making this flap out of the auricle and membranous canal to remove all unnecessary cartilage so that nothing is exposed.

Dr. McKERNON thought the case was instructive as showing the variations in the degree of removal of the posterior wall which occurred in the practice of the various operators. He thought that in this case a little more of the posterior wall had been left than was customary.

Dr. DENCH has observed perichondritis in only one case after the radical operation. In this case he had taken particular pains to avoid leaving any of the cartilage exposed and had in fact covered it with a skin flap.

Dr. BRYANT stated that he was at present closing the wounds after the radical operation completely and treating the cases without packing.

Dr. McKERNON presented a young man who had suffered from **cerebral hernia** after an operation for mastoiditis and sinus thrombosis. The interesting feature was the successful treatment of the cerebral hernia. The entire mastoid region was occupied by a dense scar at about the usual level, and there was a long somewhat keloid-like wound in the neck. the history of the case is as follows: The patient, a man 20 years of age, had suffered from atrophic rhinitis. After having experienced pain in the ear for two days a paracentesis was performed. This was followed by a thin serous discharge, and when Dr. McKernon saw the patient he seemed very ill,—partly unconscious, with a rigid neck, photophobia and rapid pulse. He was groaning and grinding his teeth. The mastoid region was especially tender. An operation was performed on that same night. The microscopic examination of the discharge revealed the diplococcus intracellularis meningitidis. The entire mastoid was found diseased. There was no free pus but considerable watery fluid. The patient remained unconscious for six days. On the seventh day he partly awoke from his unconsciousness and answered questions. The pupils

were unequal. He then relapsed into coma until the ninth day. He was then better but complained of headache. He gradually improved up to the fourteenth day, except that his temperature remained up to 103° —it then went up to 106° , and on the following day was 105° . Permission was given to operate again and the sinus was exposed. It was found of a pale, grayish color and contained a firmly organized clot which extended back to the torcular. In the neighborhood of the bulb the sinus contained a dark fluid composed of blood and pus. There was no return bleeding from the bulb, but pus continued to ooze out. The jugular was then resected after the ligature had been passed as low down in the neck as possible. The entire jugular and its branches seemed gangrenous. The dissection was extremely difficult, and a number of glands were removed. The wound in the neck was then sutured. Examination of the glands and the walls of the vein showed them to be infected with the same bacterium. After two days the temperature fell and convalescence progressed uninterruptedly, except for a hernia which occurred in the region of the sigmoid sinus. It was so large that it completely filled the wound and rapidly increased in size. It was first painted with silver nitrate without any favorable result. The surface was then sterilized as carefully as possible with salt solution and painted with flexible collodion; this was repeated about 12 times with a steady decrease in size. This treatment was most successful and at present there is no protrusion.

Discussion: Dr. GRUENING reported upon a cerebral hernia which he had also succeeded in successfully treating with collodion.

Dr. ARNOLD KNAPP thought that the unusual duration of the coma was of especial interest in this case, and asked Dr. McKernon whether he thought it was due to an interference with the cerebral circulation or to pressure.

Dr. MCKERNON replied that the case had been observed by a number of general physicians who regarded it as a case of typical cerebrospinal meningitis. A lumbar puncture was made and turbid cerebrospinal fluid obtained. The puncture was repeated twice.

To Dr. BERENS' question what effect the puncture had upon the coma, the reply was, none whatever.

Dr. PHILLIPS asked whether the speaker regarded it as a case of serous or purulent meningitis.

Dr. McKERNON thought it was probably a case of serous meningitis.

Dr. GRUENING stated that he saw no reason why cerebrospinal meningitis could not be combined with mastoiditis in the same patient.

Dr. KENEFICK asked Dr. McKernon in what way he had treated the wound in the neck?

Dr. McKERRON replied that he had followed his usual procedure, viz., of suturing the wound and of introducing a drain at the angle of the jaw, a wet dressing being then applied. At each change of dressing the drain is shortened.

Dr. GRUENING thought that the result of the wound in the neck was not at all a favorable one. He would call the condition a keloid. The wound looked as if it had been healed by granulation.

Dr. McKERNON replied that this appearance of the wound was observed six weeks after the operation and that the scar had been steadily increasing. He thought it might possibly have been due to the fact that the tissues were all so affected.

Dr. PHILLIPS presented a **specimen of a temporal bone with an anomaly** in the floor of the middle fossa and a displaced sinus, showing that an operation performed in the usual site, viz., the mastoid fossa, would on the one hand have entered the middle cranial fossa, and if the opening had been made slightly further back the sinus would have been encountered.

Dr. BERENS stated that he had exhibited to the Society several years ago, a lateral sinus which was displaced forwards and upwards so that its anterior border was covered by the suprameatal spine, the sinus thereby intervening between the cortex of the mastoid and the antrum.

Dr. TOEPLITZ reported a case in which he had encountered the sinus at the first stroke of the chisel.

Dr. GRUENING thought that it was not unusual to find the

sinus displaced forwards. He now always opens the mastoid process lower down, whereby by working up the sinus can always be avoided. He thought that this method was better than the Stacke. The antrum could frequently be entered from the posterior and the lower side of the sinus.

Dr. BERENS thought that the practice of invariably exposing the antrum first should be abandoned.

Dr. DUEL, however, did not think that this was necessarily such a bad practice, but that as a general rule it worked very well if the cortex is taken off carefully; it was very much more simple to enter the antrum first and it was comparatively easy to avoid injuring the sinus.

Dr. GRUENING made the following historical references to his original publication in which he advocated removing the tip. He was then wrongly understood and accused of not entering the antrum. This he, however, never failed to do, and it seemed to him immaterial whether the antrum was opened first or last.

Dr. ARNOLD KNAPP presented a **specimen of a purulent thrombosis of the cavernous sinus and osteomyelitis of the petrous pyramid** in a diabetic patient. The malady began by an acute purulent otitis. The patient subsequently was treated for neuralgia until the right eye became unusually prominent. Two days later the left eye also protruded. The patient's general condition grew very much worse, he was semistuporous and after four days in the hospital died. The condition at no time permitted any operation beyond a paracentesis. The autopsy revealed an osteomyelitis at the apex of the petrous pyramid, perforation of the temporal bone, and a large abscess situated on the anterior surface of the petrous pyramid near the apex underneath the dura. This extended anteriorly to the region of the right cavernous sinus. There was also some pus in the left cavernous sinus. The case will be reported in full. It is interesting to observe in this patient that the site of the abscess near the apex of the petrous pyramid was directly underneath the Gasserian ganglion, which explained the neuralgia.

Dr. GRUENING inquired whether the patient presented the

signs of herpes. He had observed that mastoiditis when complicated with herpes was always fatal. He had seen three cases. Of course herpes occurs with cerebrospinal meningitis also in cases which recover.

The answer was No.

Dr. BACON reported on the case of **head injury followed by ear symptoms**. A student at Princeton had fallen one week before he saw him, striking his head above the auricle. There was hemorrhage from the ear. After one week he was allowed up, then complained of ear-ache. There was a profuse serous discharge with some temperature. The mastoid was found very tender, and an operation was undertaken a few days later. Before the operation the discharge from the ear had become purulent. The mastoid condition at operation was not unusual. The fluid found in the mastoid contained pneumococci and streptococci. He thought the condition was interesting because it was evidently not one following fracture of the base of the skull though it simulated this condition and that probably the infection occurred, as is usual, from the nasopharynx.

Dr. KENEFICK inquired whether after the injury to the head the canal was packed with gauze. He had seen a large number of injuries to the bony canal and had found that it was much the best practice to do nothing.

Dr. KENEFICK reported the case of a child two and a half years old who presented a swelling behind the ear. A subperiosteal abscess was found and the underlying cortex was softened. The unusual feature of the case was that there were absolutely no symptoms in the canal, no sagging of the superior wall, and that the drum membrane was normal. Nor was there any history of preceding ear trouble or infectious disease.

Dr. MCKERNON inquired whether the tympanum was exposed at the operation.

Dr. KENEFICK replied No, that he did not think it was necessary inasmuch as he had obtained drainage posteriorly.

Dr. GRUENING said that cases of mastoiditis without middle ear symptoms are, of course, very rare. A diseased gland on the surface of the mastoid might secondarily involve the bone and so cause a secondary mastoiditis without any otitis media.

Dr. BACON had observed a similar case within the last two years in the Infirmary, in which also no change had been found in the drum membrane.

Dr. SHEPPARD thought that very likely the previous ear trouble had been forgotten because it got well quickly.

Dr. BRYANT stated that within the last summer he had seen a somewhat similar condition but upon close examination he elicited the information that there had been an acute inflammation two months previously without perforation of the drum.

Dr. LEWIS spoke of a case of double mastoiditis where the only symptoms in the middle ear had been a yellowish appearance of the drum. Operation was undertaken because the temperature was high, the hearing affected and tinnitus was complained of,

Dr. GRUENING related a case of **sinus thrombosis** in a boy twelve years of age. He had vomited, had had a chill, and his temperature was 103° , with a history of an old otorrhœa. Microscopic examination of the pus was negative. The patient seemed very ill, and after an observation of one day his temperature rose to 105° . Both mastoid processes were opened and found diseased. The sinus on the right side was exposed and presented a white spot. The left sinus was normal. After the operation the temperature was 101° , three days later it rose to 105° . On examining the eyes, the right one was found normal, in the left there was a distinct venous congestion of the disk. Both sinuses were then opened and bled profusely. The temperature was 100° and 104° on the next day. Optic neuritis was distinct in the left eye, the right normal. It was then decided to open the left sinus, and a very extensive clot was removed. No bleeding was obtained from below, so that the jugular and the facial veins were ligated. On cutting the vein only a thin stream of blood appeared. The pulse was very rapid. The condition of the patient was so bad that the operation could not be prolonged. A thin piece of gauze was inserted in the upper knee, and on withdrawing this a clot followed and free hemorrhage. The temperature remained at 105° for three days, then gradually came

down, with two periods of elevation. The case presented the two following interesting features:

1. The right sinus was the one which showed changes, at the same time the left was the one which was opened apparently correctly because the left optic nerve showed ophthalmoscopic changes.

2. The successful attempt to remove a clot by the insertion of gauze in the sinus.

Dr. GRUENING also reported upon two cases of **otitis and mastoiditis occurring in typhoid fever**. In the first case the ear symptoms came on in the third week of the fever. The temperature had been 100° – 103° , then it rose to 105° , at which it remained. The ears were examined and an otitis media found present. A paracentesis was performed. The temperature continued, and, as other causes could be excluded, the mastoid operation was performed. The cells were found filled with a serous fluid, the bone was very hard, no bacteria in this fluid. The patient recovered.

The second case was one of a double suppurating parotitis occurring in typhoid fever. The abscesses had been incised by a general surgeon, who had made a crucial incision, a vertical one through the skin and the incision into the gland in a direction at right angles. The right parotid had perforated into the right auditory canal so that a view of the drum was obscured. There was considerable swelling and tenderness over the mastoid. The mastoid was opened but found normal.

Dr. BRYANT spoke of a **modified radical operation** which he had recently performed upon a patient who had suffered from an acute exacerbation of a chronic purulent otitis. The ossicles and the annulus were left. The case healed unusually quickly and the hearing result was very good.

Dr. DUEL related the history of a girl of six who had developed a **knee-joint metastasis after mastoiditis**, who, however, **recovered without any operation on the sinus**. The patient gave a history of repeated attacks of pain in the ear without otorrhœa. On admission to the hospital she had suffered from pain in both ears for five days, and the left ear had then begun to discharge profusely. The right drum was

found bulging, in the left a very small perforation was present. The left antrum and tip very tender, the right slightly so. She had had some fever and was very restless. A double paracentesis was performed, and on the next day there was less tenderness over the right mastoid process. The left mastoid was opened and the sinus was exposed for one inch. It seemed to be externally perfectly healthy. The temperature then varied between 99° and 102° , making two daily excursions. There was no pain or tenderness in the right mastoid. Four days later the left knee became painful and swollen. The joint became distended. The question now arose whether this condition, which evidently was metastatic, necessitated an operation on the sinus. The right ear had ceased to discharge. Dr. Duel did not operate because the child had had no chill, the general condition was excellent and the fever was not high. The temperature varied for several days, after one week the knee was very much better, and in two weeks the child was running about the ward.

Dr. BACON thought that the temperature was not high enough to indicate a sinus involvement.

REPORT OF THE TRANSACTIONS OF THE SECTION ON OTOTOLOGY, NEW YORK ACADEMY OF MEDICINE.

MEETING OF NOVEMBER 9, 1905. DR. GRUENING IN THE CHAIR.

Extra-dural abscess with obliterating sigmoid sinus phlebitis. By L. M. HURD, M. D.

A. T., aged twenty-seven, married, metal worker; admitted to Dr. Clemens' service at the Manhattan Eye and Ear Hospital, August 8, 1905. Diagnosis, Mastoiditis with Sinus complications, of four months duration. History: Good health up to four months ago; at that time he began to have pain in his right ear, which continued with considerable severity for three days; he then had his drum membrane incised, which was followed by a profuse discharge and relief of pain. About every fourth to seventh day thereafter the discharge became scanty, followed by intense pain in the right side of head, with nausea, constipation, vertigo, chills, fever, and sweats. For the six weeks previous to operation he had pain in the mastoid process and temple, with shooting pains running over the parietal region.

Condition on admission: Discharge slight, drum membrane and supero-posterior wall markedly bulging. Perforation in lower posterior quadrant. Some tenderness of the antrum; none over the tip. Temperature and pulse normal. Operation. Usual curved incision, augmented by a posterior incision at right angles; also a short cut upward toward the parietal region. The cortex normal, unusually thick and hard; the whole cellular structure was necrotic. The antrum was small and located above the canal; the necrosis and granulations

extended upward and backward, above the lateral sinus, in which locality an extra-dural abscess was found, about one and a half inches in diameter, containing a small amount of pus. The dura was covered with exuberant purplish granulations; these granulations did not extend on to the sinus wall. The sinus did not pulsate and the walls felt thick and boardlike. On incision the wall was found to be about four times the normal thickness. The intima looked normal with no evidence of a thrombus; the thickness of the sinus wall so diminished the calibre of the vessel as to prevent the flow of blood. The interior of the sinus was dry except for a slight flow from the superior petrosal sinus. The sinus was incised from the knee about one inch in either direction, at which point the flow of blood was established. There was no evidence of a thrombus.

The subsequent history was entirely uneventful. The interesting point in this case is: Nature's method of preventing general infection through the circulation by occluding the sigmoid sinus, and if the case had not been complicated by the extra-dural abscess it probably would not have come under our observation, and ultimately it would have become a chronic discharging ear with the sinus degenerating into a fibrous chord.

A case of destruction of the cellular portion of the mastoid process: the enucleation observed followed closely the lines of the modern radical operation. By L. M. HURD, M. D.

Nine years ago this patient had a severe attack of scarlet fever, with a bad throat and enlarged glands. After the scarlet fever both ears ran and the mastoid processes became involved, and bone on both sides was taken out. On the left side, through an opening in the mastoid cortex, the facial canal and semicircular canal can be seen. The other ear is in practically the same condition, but is healed up. The patient's throat is typical of tertiary syphilis. There is a perforation of the right side of the velum, and portions of the epiglottis have been destroyed. Dr. Hurd said that at first he was sure that the case was syphilitic, either acquired or congenital, but as he could find no symptoms or history confirming either, he was

compelled to believe that the condition resulted from scarlet fever. He found twenty-one cases of this character on record. The auditory nerve was perfectly normal.

Case of infective sigmoid sinus thrombosis and jugular vein infection of otitic origin without mastoid involvement.

By J. D. RICHARDS, M. D.

Negro, male, age nineteen. Previous history negative. About a year and a half ago he had an attack of acute otitis media in the left ear, following grippe. There was a mild earache followed in twelve hours by a sero-purulent discharge and relief of pain. The drum membrane was slightly reddened but at no time bulged. The discharge gradually diminished and ceased on the fourth day. During this attack there were no mastoid symptoms.

On the morning of the fifth day the patient awoke with complete facial paralysis, which continued until the fourteenth day, when he was first seen by Dr. Richards. Examination showed the paralysis to be peripheral; no mastoid symptoms; temperature, respiration and pulse normal; eyes negative; cerebation clear; auditory canal dry; membrana tympani not reddened, though it had lost its lustre and showed evidence of having been recently inflamed. The manubrial plexus was slightly injected. For several days previous the patient had complained of constant headache, varying in intensity. Excepting for this he had felt well and had continued at his work.

Acute suppurative otitis, no myringotomy having been performed, followed by facial paralysis, and headache localized on the involved side, roused suspicion, and the drum membrane was incised, but was found to be perfectly dry. Suction with pneumatic speculum revealed nothing. The ear was then dressed and the patient sent to the hospital for observation. On the following day he was seized with a hard chill; temperature rose rapidly to 103.2° F., and suddenly remitted followed by profuse sweat. During the height of the fever the pulse rate fell from 88 to 62 per minute.

In the absence of other conditions to account for these symptoms the mastoid was explored. The bone was sclerotic,

the sinus lay superficial and far forward, the knee being practically in contact with the posterior canal wall, the major superior portion of which was removed in order to get into the antrum. The cavity was small and dry and contained a few firm red granulations, evidently the result of the previous inflammatory process. The sigmoid sinus was then exposed from beyond the knee well down toward the bulb. The middle of the vertical sinus limb descended through a patch of purulent dura. Upon palpation, the vessel was resilient, and from the physical signs alone the presence of a thrombus could not be determined. The vein was opened upon the symptoms and an apparently recent obstructing thrombus found. Free return flows from either end were obtained. Apparently healthy vessel wall was reached on both proximal and distal ends, and the diseased external vessel wall was excised. The patient was returned to bed and for a few days the condition was satisfactory, though on each afternoon there was a slight rise of temperature.

Four days after the operation the patient had a chill followed by a temperature of 104° F., succeeded by sweat. The internal jugular vein was then resected, but to the naked eye it appeared normal and contained no clot. The walls of the upper portion of the vein were invaded by large numbers of streptococci. The coagulum later found in the vein was a post-operative coagulum and was microscopically negative. A bent ring curette was inserted into the bulb end of the sinus and return flow established; and a gauze wick was introduced into the proximal end and carried well down toward the bulb.

From this time there was no further rise of temperature, the facial paralysis gradually disappeared, and the further history of the case was uneventful.

The points of interest in this case were the following:

1. During the course of an apparently mild middle ear infection septic products are transmitted to and deposited in the sinus wall in the vicinity of the knee; infective thrombosis develops and advances insidiously, and manifests itself eleven days after the subsidence of the middle ear inflammation.

2. The case illustrates the fact that it is safer to enter the mastoid over the tip than over the antrum. Injury to the sinus would have been inevitable had the attempt been made to enter the antrum as the primary step of the operation.

3. That we cannot always from the physical signs alone determine the presence of a completely obstructing clot.

4. Though we succeed in passing with the incision the upper and lower limits of thrombus and get free returns from both ends of the vessel, we sometimes fail to pass the limits of bacterial invasion, and that this limit cannot be determined by the naked eye.

5. The good effect of a timely jugular resection.

6. The difficulty of obliterating the cavity of the jugular bulb by a protective coagulum.

7. The good effect of introducing a strip of gauze into the proximal end of the sinus and carrying it well down toward the bulb if not into that cavity.

8. That when we have infective sigmoid sinus thrombosis without apparent involvement of the mastoid we should not hasten to conclude that the route of infection is through the tympanic floor. In this instance had operation been delayed for twenty-four or forty-eight hours the thrombosis might have extended down into the bulb, and it might have been inferred, though wrongly, that it was a case of primary jugular bulb thrombosis.

Report of a case of serous meningitis. By ARNOLD KNAPP, M. D.

(Published in full on page 6 of this number.)

Discussion: Dr. DENCH inquired how deep was the incision of the cerebellum when the fluid was evacuated.

Dr. KNAPP replied that the cerebro-spinal fluid came out as soon as the dura was incised. The upper incision did not reveal any cerebro-spinal fluid. It was punctured directly in front of the cerebellum.

Dr. RICHARDS inquired if there was a sudden fall of temperature following the lumbar puncture in the second case.

Dr. KNAPP replied that the temperature did not fall for two or three days. The lumbar puncture did not seem to have

any effect on the course of the disease but simply aided in the diagnosis.

Some observations in the ear clinics of Berlin, during the summer of 1905. By C. H. MAY, M. D.

Dr. MAY said that he saw very little in Berlin that he had not previously seen in New York. The Berlin aurists were extremely courteous and afforded him all facilities for observing everything, and thus he saw much in a very short time. He had spent most of his time in Jansen's Clinic, being present from 7 to 10:30 A. M.; then taking in one or two eye clinics, he could visit Lucae's Clinic from twelve to two o'clock. He spent a part of each afternoon at the Anatomical Institute, and found the work here both instructive and interesting; there was an abundance of material and specimens of dissections of various parts of the body. He had been interested in making some dissections of the facial nerve; he had no difficulty in making arrangements for the exclusive attention and help of one of the assistants for an hour or two every day; this, with the large amount of material at disposal, enabled him to spend his time there very profitably; he doubted very much whether anyone could obtain such facilities for this particular study in New York.

Regarding the work done in the Clinics, this was very much like what is seen in New York; but a few points were worthy of mention. Jansen was particularly courteous, and would, at any hour of the day or night, send notices of operations to those who were interested, and give every opportunity to see operations and follow up the cases afterward. He is a particularly fine operator and handled the chisel and mallet with unsurpassed ease and dexterity, exposing the desired region with wonderful skill and rapidity. In Berlin, chisels (Lucae's or some modification of these) are used in mastoid operations almost exclusively, the bone forceps and curette being employed much less extensively than in this country. There seemed to be a greater tendency to close mastoid wounds; in Jansen's Clinic, metal sutures (Michel's) were used for this purpose; Dr. May had seen these used before in general surgical cases, but not in mastoid wounds. The sutures consist of small, curved,

flattened metal wires with pointed extremities; they are applied with a special form of forceps, left in place for several days, and then removed with little hooks; the sutures may be used repeatedly. Dr. May said that he had not tried these sutures; they were supposed to prevent the occurrence of stitch abscesses, but he could not see that they offered any advantage over thoroughly sterilized silk sutures.

In Berlin the forehead mirror in common use is supplied with an attachment by means of which the mirror can be supported by the teeth; this removes the annoying band around the forehead. He had brought one over and had tried it in office work, but he did not like it; it did not seem cleanly. In operating, however, it might prove of advantage. An attachment to the edge of the mirror, capable of being sterilized, and permitting the operator to touch the sterilized portion in shifting the position of the mirror, seemed a good addition when reflected light has to be employed in ear operations.

The method of giving ether in Berlin clinics is peculiar; the anæsthetic is poured into a rubber bag about a foot long, having a diameter of three to four inches; this makes it necessary to take off the mask from time to time and allow the patient to breathe air. One misses seeing the Bennett inhaler, but the results seem satisfactory. In Jansen's Clinic one of the attendants had charge of the anæsthesia. Gas is seldom used and children are rarely anæsthetized for the removal of adenoids.

The instruments which formerly seemed clumsy and heavy to those used to American models, have been improved very much of late and are now as delicate and graceful as the models turned out in this country. Since instruments are subject to a heavy duty, even when brought in by the physician himself, there is no advantage in buying them abroad.

Dr. May thought very highly of the Nernst lamp for throat, nose and ear work; he had seen it in Fränkel's Clinic and elsewhere in Berlin; its adaption for furnishing light in such work gave a remarkably satisfactory illumination—solid, white and powerful. This lamp can be operated with the street

current, without rheostat; the luminous portion consists of a network of wires covered with some white material which is made incandescent by the electric current. The doctor uses such a lamp in his office and it gives satisfaction. But, unfortunately, all the renewals have to be imported, for although the Nernst lamp is used extensively in factories in this country, it has not yet been supplied in a form to permit small lamps to be employed with the voltage in common use. The lamp is about 50 candle power and is mounted in a Hirschmann model stand, which renders the rays parallel and permits them to be thrown in any direction.

THE BLOOD SUPPLY OF THE INTERNAL EAR
WITH DEMONSTRATIONS SHOWING ITS
PRACTICAL USEFULNESS IN
OTOLOGY.

By GEORGE E. SHAMBAUGH, M. D., CHICAGO.

(Published on page 11 of this number.)

REPORT ON THE PROGRESS IN OTOTOLOGY DURING THE FIRST QUARTER OF THE YEAR 1905.

By DR. ARTHUR HARTMANN.

Translated by DR. ARNOLD KNAPP.

ANATOMY AND PHYSIOLOGY.

1. VERNIEUWE. Preliminary note on the histogenesis and structure of the habenula sulcata. *La Presse otolaryngologique Belge*, 1905, Book I.
2. KOBYLINSKI. The carotid canal and the bulb of the jugular vein in practical otology. *Vortrag, gehalten in der St. Petersburger Otolaryngologischen Gesellschaft am 6, November, 1904.*
3. BALLOWITZ. The olfactory cells of the river lamprey. *Arch. f. mikrosk. Anat. u. Entwicklungsgesch.*, vol. 65, pp. 78-95.
4. POLI. On the distribution of adenoid tissues in the nasal mucosa. *Arch. internat. d'otologie*, etc., vol. xix, p. 132.
5. TSAKYROGLOUS. A case of lagorrhinos. *M. f. O.*, 1905, No. 2.
6. LUCÆ. On the nature and perception of sounds. *Arch. f. Anat. u. Physiol. Physiolog. Abteilung, Suppl.* 1904, pp. 397-408.
7. URBANTSCHITSCH. On the influence of colored perception on the sensory functions. *Bonn 1904, Arch. f. ges. Phys.*
8. FLECHSIG. Investigation on the brain. *Reports of the Mathematico-Physical Class of the Royal Saxon Society of Sciences at Leipzig*, January 11, 1904.
9. HASTINGS. A report of two hundred and eighty-one mastoid operations. *Amer. Journ. Med. Sciences*, January, 1905.

1. The author has endeavored to study the structure of the habenula sulcata by way of its embryologic development. White mice were examined, and he comes to the following conclusions: The epithelium lining the primitive cochlear canal is represented on the surface of the habenula sulcata of the fully grown animal by a row of nuclei which are surrounded by a pale cytoblastic zone and are separated from each other by connective tissue. The supporting framework of the habenula sulcata is a transformed connective

tissue which is derived from the young intracapsular connective tissue which surrounds the cochlear canal. The tissue of the habenula sulcata is not distinctly separated from the underlying tissue of the bony spiral lamina which proves their common embryologic origin. The tissues of the habenula sulcata are continuous with those of the spiral lamina. There are six drawings.

BRANDT.

2. This is a report of two cases with interesting anomalies in the course of the venous vessels in the external canal this side of the drum membrane. In the first case, which was observed in the Clinic of Professor Stimanowski, the jugular bulb protruded into the bony part of the left auditory canal 8 *mm* in length and 6 *mm* in height and covered the lower quadrant of the drum membrane. A similar, though not so pronounced a case was described by Professor Gruber. In this case the jugular bulb protruded into the bony part of the right auditory canal, 6-7 *mm* in length and 3-4 *mm* in height. Professor Gruber considers this anomaly to be very rare and as yet unpublished. The second case was a private patient of the same physician who presented a pronounced thick bulbular vessel which, beginning at the upper bony wall of the canal, passed along the stria vascularis to the drum membrane, then disappeared along the posterior border of the manubrium of the hammer, gradually becoming thinner and disappearing in the upper quadrant. Both cases are illustrated.

SACHER.

3. Our knowledge of the olfactory cells of the lamprey is not complete. Retzius was not able to satisfactorily describe the morphology of the central and peripheric ends of the cells, and Pogojeff has reported findings which oppose those previously published. The author shows, with the aid of illustrations, that the olfactory cells carry cilia which, with great probability, vibrate. The ciliated extremities of the olfactory cells protrude over the level of the surrounding framework and project out of a network which is surrounded by supporting cells and the heads of olfactory cells. The central cellular network passes into a narrow thread which shows varicose dilatations and does not always enter perpendicularly into the basal epithelium, but frequently turns and runs parallel to the basal surface and thus joins an olfactory fibre.

ESCHWEILER.

4. The author examined the adenoid tissue of the nasal mucous membrane in a variety of vertebrates and in human subjects of every age. In the fully-developed fetus of man and animals there is no adenoid tissue. This is, however, present in the new-born animal and increases with age. In advanced age there is a distinct difference in the development of the adenoid tissue in man and in animals. In animals it is sparse; adult human subjects are rich in adenoid tissue which is collected in places in follicles which may penetrate between the epithelium. It is especially the lower and middle turbinats that present an area of adenoid tissue in the mucous membrane.

OPPIKOFER.

5. Lagorrrhinos, according to the author, is a deformity which he observed in a man fifty years of age, and consisted in the fact that both nasal alæ, beginning at the tip of the nose, were separated by a fissure one *cm.* long, and that from the tip of the nose two diverging round ridges began which extended to the middle of the forehead. On each side directly over the eyebrows there was a smaller ridge. All four ridges were bony. The septum was normal, the terminals were rudimentary.

PIFFL.

6. The author distinguishes between two groups of noises, the musical ones which to a certain extent form the transition from sounds to the pure noises, and the specific ones. The latter are characterized by their lack of color which is caused by the fundamental tone as masked by the many associated tones. In some cases the individual components of the noise are uniformly distributed, in others there is a steady change in the predominant tone. A noise grows more colorless as it becomes more difficult to determine its pitch or its fundamental tone. The characteristic feature is that the fundamental tone varies with the distance from the source of sound, which becomes higher in pitch on approaching, deeper on going away. This condition is explained because the high tones, on account of their greater physiologic intensity, produce a stronger impression, while the deeper tones possess a larger physical energy which more easily overcomes obstructions. With increasing distance from the source of sound the action of the tensor tympani and the resonance of the external auditory canal become gradually less, and the fundamental tone of the middle ear becomes more pronounced. The author deduces this fact from his well-known experiments on the resonance of the external middle ear

which are again reported. The perception of musical sounds, according to the author, takes place in the cochlea. The specific sounds, he believes, require a particular organ of the labyrinth.

SCHAEFER.

7. Urbantschitsch reports on the continuation of his interesting examinations and describes the influence of colored perceptions on audition (increase or diminution of hearing acuity, changing of the pitch and disturbance of the local sensation in the ear production of subjective noises), moreover the influence of colored perception on imaginary movements and disturbances of equilibrium, on the senses of taste, smell and temperature.

BRÜHL.

8. The work represents the study of serial sections of fifty-six human brains between the stage when myelinization first begins, four months after birth, and at the time when every portion of the cortex shows some medullated fibres and the main paths are laid down, namely, four months after birth. FLECHSIG divides the cortex into thirty-six areas, of which the first twelve are myelinized before birth, and the rest after birth. The first areas in the cortex to become medullated are primary sensory areas representing smell, touch and muscle sense, sight, hearing and taste. The next group of centers have at first only fibers between themselves and are called automatic centers of unknown meaning. The rest of the areas have association bands and its earlier zones develop as a marginal zone around the primary sensory areas and receive short fibers from them; they are undoubtedly connected with the sensory areas in function. The last three zones develop long association bands first and are the great association centers. The first fibers to medullate in the brain are the primary sensory paths which extend from lower centers to the cortex. There are seven areas on the cortex corresponding with the numbers 1, 2, 4, 5, 6, 7 and 8, 1 and 4 are primary olfactory areas connected by a band of medullated fibers with the olfactory bulb; 7 is for hearing and has its subcenter in the medial geniculate body, while 6 is possibly the primary sense area for taste and has its subcenter in the thalamus and globus pallidus. The olfactory area has the fewest layers corresponding with the simple olfactory mucous membrane, while the island of cells in the subiculum cornu Ammonis correspond with the taste buds. The cortex of the area for hearing is twice as thick as in the rest of the gyrus. Each area is to be considered as a repetition

in the cortex of a peripheral sense organ. The first portion of the cortex to become medullated is the lamina perforata anterior receiving fibers from the olfactory bulb; later the olfactory fibers extend to the uncus. The olfactory system, which lies in the hippocampal zone, is the first to develop association bands. The great sensory area representing touch and muscle sense begins to medullate next after the olfactory area. The structure of the cortex of this zone is less characteristic than the areas of special sense. In contrast with the areas for smell, sight and hearing, the central sensory area develops motor fibers after the sensory ones. The cortical zone 6 may represent taste. It receives fibers from the thalamus in part, near the pulvinar. FLECHSIG thinks that taste is also represented in the central sensory area. The fibers for hearing are the first to become medullated in the temporal lobe. These fibers come from the medial geniculate body and end in a small portion of the gyrus temporalis I., not more than 1 to 2 *cm.* in area. FLECHSIG points out the enormous amount of work to be done in following the further development of the paths in the brain.

M. TOEPLITZ.

GENERAL.

a.—PATHOLOGY AND SYMPTOMATOLOGY.

9. HASTINGS. A report of two hundred and eighty-one mastoid operations. *Amer. Jour. Med. Science*, January, 1905.

10. HAMMERSCHLAG. On the heredity of otosclerosis. *Wiener klin. Rundschau*, No. 1, 1905.

11. BARTH. On bilateral facial paralysis. *Deutsche Med. Wochenschr.* No. 4, 1905.

12. POLLAK. On coughing. *M. f. O.*, 1904, No. 12.

9. The data are collected from 281 consecutive mastoid operations performed at the N. Y. Eye and Ear Infirmary during the year 1903. 447, one-fifth of all hospital patients with acute or chronic otitis media were children, 19 were infants. The mastoid pus of 69 cases examined contained streptococci in 50%, pneumococci in 29%. Mastoid swelling was found in 100 out of 447 cases; in 72 of these (56 were children) subperiosteal pus was found on operating. In the remaining 28 of swelling there was œdema with pus within mastoid. Tenderness existed in 84 over antrum and tip, in 3 over antrum only, in 8 solely at the tip, here in 2 with Bezold perforation. 37 of 281 cases had post-auricular fistulæ, 7 due to subperiosteal abscesses, 30 from former unsuccessful mastoid operation (15

Eye and Ear Infirmary cases), 7 being children. In 7 cases previously operated abscesses developed under the old scar. In 4 cases otorrhea had continued in 1 for one year, in 2 for three years, in the 4th for eight years. There were two cases of acute and subacute mastoiditis respectively, with normal drum membranes. More than one-half had on admission less than 100 °F. Of the 167 cases not operated upon, but treated by paracentesis, irrigations, ice coil, leeches, six returned after discharge from hospital and were all operated for extensive mastoid destruction; 1 with perisinuous abscess, 1 with Bezold perforation, all adults with outer table hard and thick. Of the 281 operations, 164 were for acute mastoiditis, 44 radical operations for chronic mastoiditis, 25 were radicals secondary to former unsuccessful mastoid operations, and 48 radicals primarily performed for the cure of chronic purulent otitis only (only 3 ossiculectomies). Pus was subperiosteal in 72, in mastoid cells in 82, in tip cells in 24, in antrum in 27 cases; congested cells in 2 cases; cholesteatoma in 20 chronic cases. The lateral sinus was displaced forward in 28 sclerotic mastoids. Pain was relieved by operation in 9 sclerotic mastoids. The dura was uncovered in 44 acute and 45 radical operations; in 2 infants with subperiosteal abscess meningitis and death followed. The uncovered lateral sinus was found normal in 69 operations; it was accidentally opened in 9, in 1 followed by thrombosis and death, purposely opened in 11 cases, in 9 with thrombosis. One died after the radical, 2 infants from meningitis; of the remaining 6 cases, 2 died of septic pneumonia and leptomeningitis respectively, the other 4 with a clot still without septic disintegration, recovered. Epidural abscesses were found in 21, perisinuous in 46 cases; Bezold perforation in 7. Facial twitch took place in 1 operation for acute mastoiditis whilst removing the tip, and in 21 radical operations. Of 90 acute mastoids 60 completely recovered; in 7 discharge persisted, 9 died; of the remaining 14 mastoids not healed 9 were re-operated. In the recoveries the average time of healing was 67 days, the hearing fully restored in 54 cases. Of 14 failures 11 were infants. Of 9 deaths 5 were from meningitis, 1 from sinus thrombosis, 1 from chloroform, 1 from diabetic coma and 1 from an unknown cause. Facial paralysis was 5 times a symptom in 164 acute middle otitis. It was brought on by operation in 6 cases; persisted in 3 infants, disappeared in 3. The results of 117 radical operations were personally known in 66: 26 perfect, 20 progressing to good, 2 failures, 8 deaths. The average

time of healing was in 22 cases, three months and seven days, skin grafting shortening the time. Facial paralysis followed the radical operation in 20 of 117 cases: in 4 it was complete and persisting, 10 recovered or improved, 6 were lost track of, in 8 it appeared later after the 3d to the 8th day; the latter gave a more favorable prognosis. Of 6 cases of paralysis before operation, necrosis of the Fallopian canal was found, the other 3 had resulted from operations elsewhere. Skin grafting was made in 37 radicals, in 27 on its completion, in 10 at a second operation, in 9 with perfect result, in 14 the grafts took partially, in 6 they failed to take, in 8 the results were not observed. Death took place after the radical in 8 out of 117 cases: 1 suddenly on the operating table from ether, 1 from leptomeningitis, 3 from thrombosis of the lateral sinus, 3 from meningitis. Total mortality, 17 (6.5%). M. TOEPLITZ.

10. Two family trees are given in which otosclerosis was hereditary. Unfortunately in each only one member was examined who suffered from otosclerosis, and in the second case it is not absolutely sure whether the condition was sclerosis.

The history shows that the disease always originated from the female side, the great-grandmother; in one case after childbirth. It is noticeable that a deaf man in the second generation married his deaf niece, and all of their children were deaf. The family trees show that the children in general had normal hearing.

WANNER.

11. Bilateral peripheric facial paralysis is relatively unusual, and rarely caused by ear diseases but as opposed to the one-sided diseases, it is especially characteristic and unpleasant for the patient. In the monolateral facial paralysis the healthy facial to a certain degree acts in a compensating manner on account of the disturbed movements of mastication and the pronounced disturbance of speech, the disturbance of the lip sounds, impure formation of vowels, and the movements of the jaws during speaking to compensate for the insufficient tension of the lips. NOLTENIUS.

12. The arthur describes first of all our knowledge of the reflex cough produced from the auditory canal and finds that this phenomenon can be produced in about 22% of the cases, and explains the anatomical conditions which cause the ear cough. Two cases are described in which a cough was produced by impact with the tympanic mucous membrane. In another case on touching the pos-

terior lower walls of the labyrinth the sensation of tickling and scratching was produced in the neck. Urbantschitsch has described a similar case to the last produced by an irritation transmitted from the tympanic plexus to the glossopharyngeal nerve. The author in his case believes that a simultaneous excitation of the glossopharyngeal and of the trigeminal nerves was produced, and that it consisted in a heterogeneous nervous cough. PIFFL.

(b.)—METHODS OF EXAMINATION AND TREATMENT.

13. HINSBERG. Examination of the ear. *Sep.-Abdr. aus Lehrbuch der klin. Untersuchungsmethoden von Prof. Eulenburg, Kollé, Weintraud.*

14. HAMMERSCHLAG. On the diagnosis of the functional diseases of the sound-perceiving apparatus. *Wiener allg. med. Zeitung*, xlix, 45-46.

15. SONDERMANN. On suction treatment of ear diseases. *A. f. O.*, vol. 64, p. 15.

16. SONDERMANN. A new apparatus for massage of the ear. *A. f. O.*, vol. 64, p. 22.

17. SZENES. In what way can we act against the apparatuses advertised to cure all deafness? *A. f. O.*, vol. 63, p. 254.

18. HÖLSCHER. On paraffin in aural surgery. *Med. Korresp.-Bl. d. Württemb. ärztl. Landesver.* 1904, No. 33.

19. URBANTSCHITSCH. Some new ear and nose instruments. *M. f. O.*, 1905, No. 1.

13. This is an excellent description of the methods of examining the ear which are of value to the general practitioner. The previous history, inspection, palpation, catheterization, methods of testing the hearing, determination of one-sided deafness, determination of simulation, electric examination, general examination and static examination are described. The technique of Politzer's experiment is not given, probably inadvertently, in the chapter on the examination of the middle ear with the introduction of air by the tube. BRÜHL.

14. The phenomenon of fatigue of the healthy 8th nerve is described, which is of course more pronounced in diseases of the nerve. A vibrating tuning fork is held in front of the ear until it dies out, then it is again held before the ear without starting it to vibrate. The patient then will hear the sound again on repeating the experiment once or twice. It seems to me there is a loss of relation between the hearing distance for voice and the hearing duration for the tuning fork. BRÜHL.

15. The author recommends this method of treatment with a specially devised apparatus to remove the discharge in acute and

chronic middle ear suppurations. He thinks it especially important that the apparatus can be employed daily by the patient himself. The apparatus can also be employed to exert a suction on the middle ear by way of the tube. HAENEL.

16. Sondermann's apparatus for suction treatment of middle ear suppurations can also be employed for the massage of the ear, and is especially adapted for treatment by the patient himself.

HAENEL.

17. The author believes that aurists should attempt to instruct the public on the fraud which is perpetrated by placing on sale instruments of no value, and frequently injurious, which are said to cure all degrees of deafness. He was able to prevent the patenting of such an apparatus in the Royal Hungarian Patent Office.

HAENEL.

18. Report of three cases in which, according to Politzer's method, the mastoid cavity was filled with paraffin of 43 % melting point some time after the operation.

Case I. A girl one year of age. At operation the diseased sigmoid sulcus was exposed for $1\frac{1}{2}$ cm. The wound reopened three months later, and at the second operation the entire cavity had to be again explored and the bony wall curetted. Three days later the cavity was filled with paraffin and the cutaneous wound closed with sutures without result.

Case II. A man thirty-six years of age. The entire mastoid process was removed up to the posterior wall with opening of the antrum. Ten days later the large cavity was filled with paraffin and the wound was sutured. Uneventful recovery without reaction.

Case III. A forty-two year-old male patient. Extensive disease of the temporal bone, extradural abscess on the left petrous surface. Resection to the area between the porous acusticus and the jugular foramen. Fourteen days after operation paraffin and suture. Recovery without reaction.

MULLER.

19. 1. An apparatus for irrigating the attic. 2. An instrument to determine small distances in the depths of the nose and of the external auditory canal. 3. Nasal Vibrator. According to the vibrating apparatus invented by Ewer for the larynx, a similar apparatus has been invented for the external nose which is supposed to do good service in the acute swellings of the mucous membrane.

PIFFL.

C.—DEAF-MUTISM.

20. HABERMANN. On congenital deaf-mutism. *A. f. O.*, vol. 63, p. 201.

21. FALTA. On the care of deaf-mutes. *A. f. O.*, vol. 63, p. 161.

22. SAINT-HILAIRE. On the pathology of deaf-mutism. *Arch. internat. d'otol.*, etc., vol. 19, p. 125.

23. TRÖMMER. On the pathogenesis and treatment of stuttering. *Wiener klin. therapeut. Wochenschr.*, Nos. 8 and 9, 1905.

20. The temporal bones were obtained from a deaf-mute forty-four years of age who had died of pernicious anæmia. The author gives the results of his examinations briefly as follows: The right ear: In the middle ear there is a moderate chronic inflammation, with thickening of the mucous membrane and broad adhesions of the head of the hammer to the upper wall. There are adhesions about the head of the stapes. There is a moderate hyperostosis in the posterior area of the promontory and a small exostosis in the anterior wall of the niche and of the oval window. The anterior and lower part of the base of the stapes is thickened and there is a circumscribed necrosis of the lower posterior part. In the internal ear the nerves of the round saccule of the cochlea are atrophied as well as the peripheric ganglion cells in the spiral canal. The ductus cochlearis is enlarged in the greater part of the cochlea. In the final part of the basilar whirl it is diminished by partial adhesions of the walls. The stria vascularis has changed in form in one part of the basal and of the apical convolutions. Hypoplasia of Corti's organ. The endolymphatic circulation in the cochlea is disturbed. Similar conditions were found in the left ear but of different degrees. In regard to the interesting peculiarities, it is necessary to refer to the original. The probable cause is supposed to be an inflammation which occurred in embryonal life. HAENEL.

21. General rules for the treatment of deaf-mute children. The proper selection of toys, pulmonary gymnastics, running exercises, speaking exercises, instruction after the 7th year. The use of uniforms for deaf-mutes in cities aids in the determination of a professional avoidance of alcohol and nicotine excesses.

OPPIKOFEK.

22. In one hundred and thirty-one inmates of the Deaf-Mute Institution of the Seine, fifty-one belonged to the congenital and seventy-five to the acquired deaf-mutism. In six the nature of the

deaf-mutism was uncertain. The congenital as well as the acquired deaf-mutism is present especially in degenerate families.

OPPIKOFER.

23. Trommer regards stuttering as superinnervation, as hyper-tonia of certain speaking muscles. It consists in a convulsive innervation of a beginning position in phonation.

He believes that every stutterer is placed under an auto-suggestion. There is no coördination-neurosis but a forced neurosis. He does not believe that stuttering is associated with adenoid vegetations, and the facts do not confirm that neurasthenia is caused by disturbance of speech. As stuttering is most pronounced between the 4th and 7th year, it is important during these years that the parents and educators of the children should be especially careful to draw the attention of the child to the quality of its speech.

The author is opposed to Gutzmann's method and recommends the use of only the potent factors in this method, namely, 1. Speaking with prolonged vowels, 2. Speaking in a monotone rythm, 3. The combination of sound pictures in which each sentence is converted into a word and the initial position is avoided. He believes that hypnotism can be recommended as a cure and gives a number of examples.

WANNER.

EXTERNAL EAR.

24. SPRINGER. **The development of hemangioma after perforating the ear lobule.** *Prager med. Wochenschr.*, 1904, No. 34.

25. SZENES. **On the therapeutic significance of secondary otitis externa.** *A. f. O.*, vol. 63, p. 268.

26. LEWIN. **A case of unusual escape of cerebrospinal fluid from the ear with intact drum membrane.** *Vortrag, gehalten in der St. Petersb. otolaryngolog. Gesellsch. am 18, Dez. 1904.*

27. SZENES. **Report of cases.** *A. J. O.*, vol. 64, p. 1.

24. A child with a hemangioma of the left lobule as large as the head of a pin, suffered from a purulent inflammation in this locality after the lobule had been perforated by a midwife. Subsequently the hemangioma developed rapidly and extended over the lower half of the external and inner surface of the auricle. After treatment with hot air and puncture with the thermocautery, the tumor diminished in size.

A similar second case is also reported.

PIFFL.

25. The author repeats a previously expressed opinion that in

acute purulent otitis the onset of a diffuse inflammation of the auditory canal exerts a beneficial influence on the course of the otitis media.

HAENEL.

26. The author demonstrated a patient, a girl fourteen years of age, who after an injury three weeks previously with a small wound at the left ear discharged an unusual quantity of pale, watery fluid, (between 2 and 3 litres daily). On examination the bony part of the left auditory canal was found narrowed on account of a swelling of the walls, especially of the anterior, which at the transition to the upper wall was contiguous to the short process. Palpation of the anterior wall and pressure on the tragus caused severe pain. There is no perforation or rupture, nor any other sign of a hemorrhage to be seen on the drum. The hearing of the left ear is very much reduced. The author believes that this is a case of traumatic injury of the base of the skull with resultant fissure which passed through the upper and anterior walls of the auditory canal without having invaded the labyrinth capsule. The rupture of the soft parts probably took place behind the swollen anterior wall of the canal in the anterior and upper angle.

SACHER.

27. Three tumors of the aural region are described: 1. Giant-celled alveolar melanosarcoma of the right auricle. Onset three years ago. Removal by operation. Death four months later from miliary tuberculosis. No metastases found at autopsy. 2. Epithelioma of the auricle in a man seventy-one years of age. Onset six years ago. After the operation rapid recovery. Up to the present time no recurrence. 3. Free osteoma of the right auditory canal. It developed in a woman fifty years of age from an exostosis of the posterior auditory canal from which it subsequently became entirely separated. Previous middle ear suppuration of long standing. The removal of the tumor took place after retraction of the auricle.

HAENEL.

MIDDLE EAR.

a.—ACUTE OTITIS MEDIA.

28. LABARRE. Cases of acute mastoiditis not preceded by otitis. *Journ. Amer. Med. Assoc.*, November 26, 1904.

29. HRACH. A case of metastatic pneumonia after a suppurative otitis media. *Wien. med. Wochenschr.* No. 11, 1905.

28. Differing from the generally accepted rule that mastoiditis develops from otitis, cases are occasionally observed in which one of

the two cavities is invaded with a purulent inflammation while the other remains free. These cases are not unimportant, because their diagnosis is difficult and their consequences are often unpleasant. The explanation, according to the author, is that in consequence of disturbance of circulation the swollen mucous membrane of the aditus forms a barrier in cases of purulent inflammation, so that the middle ear becomes invaded while the antrum remains free. The diagnosis and treatment are described. Stress is laid upon early "paracentesis of the antrum," i. e., the mastoid operation. Four cases are reported.

BRANDT.

29. Hrach believes that an old ear process was set up anew by influenza which led to a thrombophlebitis and sepsis. WANNER.

b—CHRONIC MIDDLE EAR SUPPURATION.

30. MAX. Abnormal topographical relations of the internal carotid and the bulb of the jugular vein to the tympanum. *Wiener med. Wochenschr.*, Nos. 1, 2 and 3, 1905.

31. LEDERMANN, M. D. Radical operation for the removal of a bullet weighing 70 grains embedded in the internal wall of the middle ear, with decided improvement in the subjective symptoms. *Medical Record*, March 11, 1905.

32. RICHARDS, J. D. Technique of the radical operation for chronic suppurative otitis media. *Annals of Otology, Rhinol. and Laryng.* March, 1905.

33. PHILIPS, W. C. Radical operation for chronic otitis media; two fatal cases. *Annals of Otology, Rhinol. and Laryngol.* March, 1905.

30. After a review of the literature on the subject, the case of a seventeen-year-old patient with right-sided otorrhœa is described. At the medial, anterior and lower tympanic wall there was a defect mucous membrane. It was occupied by a bluish-gray, soft elastic in the bone, which was 1 to 1½ mm. deeper than the surrounding membrane which was in constant motion. The pulsation was synchronous with the pulse and on operation disappeared with the diminution of the pulsating surface.

The various cases of hemorrhage from the carotid artery are then reported. In the second part Max gives a description of the five cases which have been published where the bulb has been injured by paracentesis, and adds a sixth case. A child four years of age, suffering from rickets, left-sided acute otitis, after paracentesis performed in the posterior upper and posterior lower quadrants severe hemorrhage from the canal and nose. After recovery the posterior

lower quadrant and part of the lower portions of the upper are bluish-white in color with a convexity directed upwards. Pressure exerted on the region of the internal jugular causes the posterior lower quadrant to be more distended and the bluish-white color more intense. The right drum shows a similar condition.

This case of Max's is the only one in which the injury occurred on the left side. The author recommends in cases of hemorrhage a pressure dressing with iodoform gauze.

WANNER.

31. A colored woman, twenty-four years of age, was shot three years ago in the left side of the head at close range with a 32 calibre revolver held within six inches of the head, the bullet entering above the tragus. She was unconscious for several weeks and dizzy until the time of operation. Facial paralysis followed the injury and remained, as also suppuration. The external auditory meatus was obstructed by a fibrous tumor, which was removed. The posterior half of the left membrana tympani was largely perforated and the edges covered with granulations. The opening in the drum seemed to be filled with a darkish mass resembling a blood clot of bluish color, metallic sound, the bullet in situ. The leaden mass extended behind and above the posterior and superior boundary of the annulus tympanicus. The radical operation revealed upon elevating the periosteum small dark spots over the bone surface where particles of lead had spattered as the molten mass had entered the skull. The large mass of lead occupied the posterior surface of the internal wall of the middle ear. The bullet could not be lifted from its bed, but was removed piece-meal with chisel and mallet, and with the curette 70 grains of lead in shavings. The dizziness was much lessened, the speaking voice perceived and the patient able to walk without support. The facial paralysis slowly improved.

M. TOEPLITZ.

32. *Richards* makes a curved incision from the mastoid tip to a point of the scalp corresponding to the top of the pinna, its center about one inch posterior to the line of the auricular attachment. The knife should sink to the bone except in the part above the posterior zygomatic root only down to the temporal fascia, preserving the temporal muscle. The posterior lip of the curvilinear incision should not be retracted. The cartilagino-membranous canal is next separated from the bony canal. The removal of bone should be commenced by enlarging with the gouge the postero-superior arc of

the bony meatus backward, instead of entering the antrum primarily. For the enlargement of the excavation of bone cavities a strong round curette, for the removal of the bony "bridge" between antrum and tympanic cavity the Jansen forceps is used, but the chisel cannot be laid aside in the latter procedure. The external attic wall is then removed, followed by the lowering of the "inferior pillar" over the vertical portion of the facial with the curette. The external wall of the hypotympanum, viz., the inner end of the floor of the auditory canal, should be removed with the curette, as also the pneumatic cells posterior to the round window and in the posterior portion of the hypotympanum. The hump in the middle of the floor of the auditory canal should be levelled, and the floor itself be widened at the expense of the base of its anterior wall, the extreme anterior portion of the annulus tympanicus is also removed with the round curette. The accessible portion of the tensor tympani muscle and its canal is destroyed, and also the diseased cells found in the vicinity of the tympanic orifice of the Eustachian tube. The meatus is made from a large curved upper flap bevelling into the concha and a slight inferior flap both held in position by sutures. A small skin graft is applied to the facial ridge. The curvilinear incision is sutured. Secondary skin grafting is done through the meatus, but not over the windows as soon as healthy granulations arise. Of 22 consecutive chronic cases operated upon according to the above technique, complete epidermisation has followed 21 times.

M. TOEPLITZ.

33. Case I. Girl, aged fifteen years, right ear began to discharge three years ago while being treated for tubercular hip joint disease and with evidence of pulmonary tuberculosis. Two years later she had an attack of keratitis followed by specific iritis. Ossicles necrotic, profuse discharge. Radical operation. The mastoid cells were involved, the pus contained smegma bacilli; the dura was exposed for a considerable area. Closure of posterior wound. Temperature fluctuating between 100° and 102° . Pus from the posterior wound. On third day after operation severe headaches, discharge odorous. Swelling and œdema about the wound, but subsiding. On sixth day T. 104° , on ninth— 106.6° . Unconsciousness. Death. No autopsy. No marked symptoms of intracranial disease. Case II. Girl of twenty-one, had diphtheria when three years of age, followed by suppuration of both ears. Pain in the right mas-

toid, right facial paralysis. Smear from the discharge showed a mixed infection. Radical operation. The antrum was filled with a tumor-like mass, the middle ear with granulations. The posterior wound was closed. The next day vomiting, severe pain in the lumbar region, T. 99°. On second day T. 104°. Pulse intermittent. Urine contained much albumen and casts. Death on third day. Two weeks before admission to hospital she had vomiting, headache, partial loss of consciousness, lasting for three to four hours. No autopsy. M. TOEPLITZ.

C.—CEREBRAL COMPLICATIONS.

34. ALT. The relation of purulent otitis to epidemic and tuberculous meningitis. *M. f. O.*, No. 9, 1904.
35. HOFER. Otitic meningitis. *Wiener med. Wochenschr.* No. 5, 1905.
36. ALT. Cholesteatoma of the middle ear as a cause of intra-cranial disease. *Wiener med. Presse*, No. 5, 1905.
37. HENNEBERT. Purulent meningitis of otitic origin healed after the mastoid operation. *La Presse oto-laryngologique Belge*, 1905, Book 1.
38. SOKOLOWSKY. On the diagnosis and the question of operation in diffuse otitic purulent meningitis. *A. f. O.*, vol. 63, p. 238.
39. GROSSMANN. On lumbar puncture and circumscribed meningitis. *A. f. O.*, vol. 64, p. 24.
40. SSACHAUSKI. On otitic pyæmia. *Russki chirurgitscheski Archiv*, 1903, Book 6.
41. MCKERNON, J. F. Case of brain abscess resulting from chronic purulent otitis media. *Annals of Otology, Rhinol. and Laryngol.*, March, 1905.
42. CLAIBORNE, J. H. A case of purulent meningitis following an attack of acute middle ear disease. Death. Autopsy. *Ann. of Otology*, December, 1904.
43. DUEL, A. B. Cases illustrating difficulties in diagnosis in intra-cranial extension of suppurative otitis in the presence of a pulmonary complication. *The Laryngoscope*, January, 1905.
44. RICHARDS, J. D. A case of infective lateral, sigmoid and superior petrosal sinus and jugular vein thrombosis. Operation. Recovery, *Amer. Journ. Med. Science*, February, 1905.
45. ALLEN, J. F. Fatal case of cerebellar abscess. *Amer. Medicine*, January 7, 1905.
46. DENCH, E. B. A case of acute suppurative otitis media complicated by double pneumonia, septic thrombosis of the jugular bulb, operation. Excision of internal jugular; general systemic infection, death. *The Laryngoscope*, January, 1905.
47. MCKERNON, J. F. A case of brain abscess following purulent disease of the middle ear. *N. Y. Eye and Ear Infirmary Reports*, January, 1904.

34. The author is of the opinion that the ear is to be regarded as the port of entrance or the intervening medium of infection in epidemic cerebrospinal meningitis. The proof has thus far not been furnished because the ears have not been examined in enough cases in the living and frequently overlooked at autopsy.

Based on two personal and four observations of other authors, the author further states that in his opinion acute otitis media not of tuberculous character in patients with a latent tuberculosis may be the cause for the development of a tuberculous meningitis, and these meningeal inflammations should themselves be regarded as otitic.

PIFFL.

35. Two cases of chronic suppurations with extradural abscesses in the middle and posterior fossæ, which recovered; 1 case of purulent meningitis terminating in death. Puncture of the dura evacuated clear serum. Lumbar puncture produced slight but diffuse cloudiness with minute follicles. At operation there was no purulent focus. The author believes that the suppuration extended along the anastomatic lymphatic and blood vessels. The case was presumably one of influenza.

WANNER.

36. This is a paper meant for the general practitioner in which the origin of cholesteatoma in general coincides with the theory of Habermann-Bezold; then the conservative and operative treatment are added, and the advice is given to the general practitioner to undertake the study of otology.

WANNER.

37. The operation in purulent meningitis consists in the complete surgical removal of the original trouble (the mastoid operation in acute cases, the radical operation in chronic cases, extraction of sequestra, opening of the labyrinth, opening of the cranial cavity), in extensive lumbar puncture, in exposure of the cerebral membranes, crucial incision and frequently repeated lumbar puncture. A cured case of purulent meningitis was reported.

BRANDT.

38. This case observed in Gerber's Clinic showed the presence of bacteria in the lumbar fluid, so that the diagnosis of diffuse purulent meningitis seemed confirmed. After five days in which the classical symptoms of meningitis gradually gained in intensity, the case was brought to recovery by the operative exposure of the primarily affected middle ear (cholesteatoma). In literature the author was able to find five additional cases where diffuse purulent meningitis of otitic origin had been cured by operation. Con-

sidering that the two cases reported by Schulze were undoubtedly cases which recovered without operation, Sokolowsky does not maintain that all severe cases of this kind should be treated by operation, but recommends to leave unoperated cases which run a very acute course. The more subacute cases should be operated upon. This case is also interesting because at a secondary operation a large sequestrum of the cochlea was removed. The table of labyrinth necrosis collected by Oesch-Gerber is supplemented by these five other cases, so that the published cases now amount to ninety-five.

HAENEL.

39. This case from Lucae's Clinic was one of chronic purulent otitis suggestive of a diffuse purulent meningitis. Diplococci were found in the cerebrospinal fluid. The operation, nevertheless, was undertaken because the sensorium was free. Recovery took place. This case is not regarded as one of healed diffuse meningitis but rather a proof that slight turbidity and the presence of bacteria in the lumbar fluid occur in circumscribed meningitis. It seems most probable in this case that there was no inflammation of the meninges and that the increase and changed constitution of the cerebrospinal fluid was simply influenced by the absorption of purulent masses by way of the lymphatics. In order to prove that the resorption of the toxic substances may change the constitution of the liquor and may clinically resemble the septicemia of a diffuse purulent meningitis Grossmann reports a case of septicemia of otitic origin which terminated fatally under the picture of a meningitis where lumbar puncture showed a clouded fluid under pressure containing numerous pus corpuscles but no bacteria. Finally a case of circumscribed meningitis with focal symptoms was reported, which was cured by operation but where no lumbar puncture was performed.

HAENEL.

40. The histories of eleven personally observed cases are given, of which six were cases of pyæmia and five of sinus thrombosis. Of the first group two recovered after metastatic foci had been opened; of the second, one recovered.

SACHER.

41. A girl, aged eleven, had an almost continuous discharge for eight years after measles. She was during the last month very dull and irritable, at night restless and crying as if in pain. Four days before she was first seen there was vomiting, with photophobia, headache, stupor, unconsciousness and refusal of food. The color was indicative of sepsis. T. 97.3° , P. 52., R. 14. The right

external meatus was filled with a large polypoid mass and pus. Diagnosis: Brain abscess. Double choked disks. Brain exposed primarily and entered near the floor of middle fossa, directly above the mastoid antrum. Dura white and lustreless, not prominently bulging. The knife was directed upward for an inch and pus was gushing through the opening with much force to the amount of from 3 to 4 oz. The abscess was limited by membrane. The pulse increased. The necrotic mastoid filled with cholesteatomatous masses was emptied. Impairment after six hours. T. 106° , P. 180. Death eight hours after operation. The pus contained mixed infection.

M. TOEPLITZ.

42. A man aged forty-five, coryza for one week; acute pain and copious purulent discharge in right ear; constant headache; dizziness for one month. Apparent relief with onset of coma; flexure of right arm and hand; left sided conjugate deviation of eyes. Optic disks normal. Chin turned to the right and upward. Death. Autopsy: Pia covered with thin yellowish pus over the right mastoid, the entire cortex and some over the base of the brain. Petechiæ on petrous bone and tegmen antri, in which there is a small aperture, through which the pus passed into cranial cavity.

M. TOEPLITZ.

43. In case I., a girl, six years old, two weeks after recovery from a broncho-pneumonia with acute suppurative otitis media sinistra, the ear discharge continued, and a week later mastoidectomy was performed. Intermittent temperatures between 106° and normal temperature for three days. Lungs free. A disintegrating thrombus extending from the knee to the jugular bulb was found in the lateral sinus. Jugular tied below the clavicle and dissected out to bulb, enlarged gland along the vein removed, clot taken out of the sinus, the walls curetted and packed. Recovery. Case II. A woman had grippe, acute catarrh of the respiratory tract, acute bilateral otitis media followed by double paracentesis. Tenderness of the right mastoid. Discharge contained streptococci and a diplococcus resembling pneumococcus. Temperatures intermittent between subnormal and 106° , and two chills. Recovery without cough or expectoration. Case III. A female, seventeen years of age, had an otitis media acuta dextra, T. 101.8° . Incision, streptococci, tender mastoid, sagging of posterior upper canal. Mastoidectomy revealed pus and granulation. After operation T. be-

tween 100° and 104.6° . Leucocytes 20,000. Seventy hours after the first rise of temperature a lobar pneumonia of the right lung was found. Crisis took place on the fifth day. There had never been any cough nor expectoration. Further intermittent temperatures for ten days were due to resolution. M. TOEPLITZ.

44. After an acute suppuration of the middle ear and a repetition after more than three years, an acute exacerbation took place ten months later with profuse purulent discharge, which apparently ceased at the end of the third week. Two days later spontaneous pain appeared in mastoid, and also intermittent headache. No fever, but vomiting. Marked tenderness over tip, exquisite over mastoid. T. 99° . Under mastoid cortex pale velvety granulations between healthy cells containing straw-colored fluid (septic phlebitis of minute veins.) Schwartz-Stacke operation. No pus in cells and antrum, but profuse exuberant granulations. Vessel wall of vertical limb of sigmoid sinus covered by dirty blackish, breaking-down granulations. The sigmoid sinus was exposed, but not opened. Extensive osteomyelitis of occipital and parietal bone. Three hours after operation temperature rose to 100.4° and continued the next day somewhat higher. Right papilla now blurred. The sinus was opened below the knee, the lumen was occupied by firm, granular clot, but did not contain fluid blood. Jugular was resected; it contained fluid blood only to the point of entrance of the facial into the jugular vein. Jugular was ligated behind the sterno-clavicular joint and resected. The superior petrosal sinus was occluded. The external wall of the lateral sinus slit out to a point $\frac{3}{4}$ " from the torcular; midway between this point and the sinus knee four or five drops of pus exuded from the clot. The opposite jugular was blocked for the purpose of creating a reverse pressure upon the torcular and on the thrombus, dislodging it, followed by a spurt of blood and the extrusion of a thin liver-colored clot, $\frac{1}{2}$ " long. The torcular end of the sinus was then gently curetted after pressing upon the opposite internal jugular. On the fourth day after the operation papillitis in the left eye. On the fifth day, upon removing the packing, several drops of pus exuded from the upper wound. The pus in the lateral sinus contained pure staphylococci. When attempting to curette a thrombus from the region of the bulb, pressure should be made not only over the internal jugular of the corresponding side, but also

over both internal jugulars, thus eliminating more effectually the aspiratory influence of inspiration. RICHARDS does not advocate the attempt at curetting the region of the jugular bulb prior to jugular ligation after having slit the external wall of the vessel to a point as near the bulb as possible. M. TOEPLITZ.

45. A male, aged sixteen, suffered from a left otitis media acuta, slight tenderness of the mastoid and discharge a year prior to present attack, which began three days before admission with severe pain in left ear and mastoid tenderness for two days. The membrana tympani was bulging in the posterior superior quadrant. Paracentesis followed by free discharge of pus; Leiter coil. Two days after admission, vomiting. Next day another paracentesis, dullness and apathy, but sensorium free. Lower jaw deopped, expression vacant. Pain in the ear removed by incision. On day following temperature 100° , pulse 80. Headache appeared in the left temporal region, numbness in hands and feet. The posterior superior wall of the membranous canal was drooping, tenderness over tip and antrum continued. Operation, usual mastoid, revealed much pus below cortex, and with granulations in antrum and cells, which extended far backward toward occipital bone. Improvement lasted ten days, except slow pulse. Expression natural, pallor continued, but headache disappeared. P. 55, T. 99° – 100° . Ten days after operation, headache now in left frontal region, drowsiness, mental dullness continuing four or five days. On fifteenth day vomiting, T. 102° . Headache violent, T. normal again, at night 102° . Leukocytosis 15,000. Second operation. Uncovered sinus and exposed dura were found normal. T. following operation normal, P. 70, headache now in right occipital region, and vomiting on second and third day. Headache decreased, somnolence increased. P. 100° in the morning, 95° in the afternoon. Intelligent answers were given when aroused, some irritation of manner followed by active delirium lasting an hour. Eyes normal, Cheyne-Stokes phenomenon; semi-comatose. Third operation: Incision extended upward, flap over squama, dura exposed from tegmen to $\frac{4}{5}$ cm above, 3 cm wide, found normal. Brain probed without result. T. after operation 103° , P. rapid, feeble, intermittent, Cheyne-Stokes respiration, death. Pathological diagnosis: Suppurative mastoiditis. Abscess of the cerebellum. Pneumococcus infection. Pia congested, cerebro-spinal fluid clear.

In removing the brain from skull an abscess was found below, the tentorium cerebelli was ruptured and about 30 *ccm* of odorless pus escaped. A perforation in the cerebellum at a point corresponding approximately to the internal auditory meatus, possibly caused by trauma in removing the brain. There was no adhesion between cerebellum and temporal bone. On dissecting the left cerebellar lobe an abscess cavity about 4.5 *cm* in diameter, without pyogenic membrane of recent date. Smears from pus revealed lance-shaped diplococcus.

M. TOEPLITZ.

46. A man, aged thirty-one, had been suffering for a week from severe pains in the left ear, following an attack of grip. The ear was discharging for three days. On the way to the hospital a severe chill took place. There was a slight amount of sero-purulent discharge from the left ear. The drum membrane was bulging, a small perforation and the upper posterior wall of the meatus sagging; some tenderness over mastoid antrum, acute tenderness over tip and behind it. Free incision into drum and sagging canal. Pneumonia of the right lower and of the left lower lobe of the lung. The ear drained freely; the discharge contained streptococci, the sputum pneumococci. On the 12th day patient defervesced to 100°, but in a few hours T. rose to 105.5°. Remission on the next day to 100° with another rise, the fluctuation continuing for several days. At entrance into the hospital pain was felt in the right knee joint, mastoid tenderness only at tip and below. Septic temperature was considered due to lesion at the jugular bulb. Operation on the 19th day. No pus in mastoid, sterile fluid in a few cells at the tip. The lateral sinus contained a clot. Two drachms of pus escaped from the region of the bulb. No circulation was established in a downward direction. The jugular was ligated low down in the neck and dissected. Temperature sank to 101°, but rose again intermittently and was twice 106°. There was pain in the left knee, left wrist and right shoulder. A tumefaction in the neck over a point at the upper end of the ligature of the jugular was incised; sero-sanguinolent fluid escaped. Death ensued seventeen days after the operation from profound general sepsis.

M. TOEPLITZ.

47. A male, aged sixteen, had a discharge from the left ear for twelve years following measles. During the past years he had several attacks of pain with interruption of discharge. For the

last six weeks continuous headache, past three weeks fever, chills every other day prevailed. For the past two weeks he was drowsy, comatose, delirious and screaming at night. Stiffness of the muscles of the back of the neck, marked aphasia and septic appearance were noted. Choked disks and retinal hemorrhage observed. Death took place before an operation could be instituted. The autopsy revealed adhesions over tegmen tympani. In attempting to remove the brain, an abscess in the left temporo-sphenoidal lobe was ruptured with much greenish pus occupying the entire lobe and occipital portion. The opening in the tegmen was $\frac{1}{16}$ " in diameter, corresponding to depression on the under surface of the temporo-sphenoidal lobe. There was a mixed infection.

M. TOEPLITZ.

d.—OTHER MIDDLE EAR DISEASES.

48. JUERGENS. Chemical burn of the jugular vein and of the carotid artery from the ear resulting in death from hemorrhage. *M. f. O.*, No. 10, 1904.

49. LEWIN. On diphtheria of the middle ear. *A. f. O.*, vol. 63, p. 229.

50. WELLS. Two cases of objective aural tinnitus due to the action of tubo-palatal muscles. *Journ. Amer. Med. Assoc.*, January 21, 1905.

51. SMITH, S. MACCUE. Bezold's variety of mastoid disease complicating diabetes mellitus. *American Medicine*. February 11, 1905.

52. RICHARDSON, C. W. Osteo-myelitis of the temporal bone. *The Laryngoscope*, April, 1905.

53. HARRIS, T. J. Electrolysis of the Eustachian tube. *Ann. of Otol.*, etc., December, 1904.

48. The case is that of a young soldier, and the caustic action had been produced by a strong acid. The patient died seven weeks later, bleeding to death after the hemorrhages had repeated themselves fifteen times. They were at first venous, from the jugular vein, later arterial in character, from the internal carotid. The author has already published similar cases.

PIFFL.

49. Lewin objects to the standpoint of Koprak, who believes that the diagnosis of middle ear diphtheria should be made purely from bacteriological examination without reference to the pathological condition of the diphtheritic inflammation, and demands that the diagnosis of middle ear diphtheria should be made by the bacteriological presence of diphtheria bacilli and the typical fibrinous membranes in the middle ear.

HAENEL.

50. Case I. A young man, aged twenty-four, had for the past

two years, been subject to a loud ticking noise in both ears, increasing and more distressing of late, likened to the snapping of fingers, occurring ten to twenty times in quick succession, and about sixty times a minute, more persistently when tired, also during swallowing and deep breathing. The noise is accompanied by an up and down movement of the larynx, which may be unaccompanied by the aural sounds. The snapping could be heard at about 12" from the ear. Watch A. U. $\frac{1}{2}$. The muscles of the pharynx and the palate were in an almost continuous spasm, accompanied by the up and down movement of the larynx, isochronous with the aural sound. The posterior lower lip of the Eustachian tubes moved forward and upward, narrowing the opening of the tubes.

Case II. In a young woman a voluntary clicking had existed for a long time, associated with feeling of fullness in the right ear, produced by a movement of the throat similar to that made in the act of yawning. The clicking could be objectively perceived four or five inches away from the patient. There were slight, jerky contractions of the posterior pillars with occasional elevation of the palate; the clicking noise was isochronous with the contractions of the m. palato-pharyngeus. M. TOEPLITZ.

51. SMITH gives the history of but one of the diabetic ear cases, which were nearly alike, as follows: A man, aged forty-one, had, in his 36th year of age, a sudden increase in the amount of urine voided with specific gravity 1030-1055, sugar of from 4-10 %. After a year severe pain appeared on the left side of the head and mastoid and continued for three weeks, when the neck below the tip became very painful. Two weeks later a fluctuating swelling appeared below the mastoid, which enlarged a week later and descended to a point about 1" above the clavicle. There was never any pain in the middle ear nor any swelling over the process. Schwartze-Stacke operation exposed a large carious opening perforating the tip of mastoid. The antrum and the superior part of the cells presented dry gangrene or necrosis, the tip was bathed in greenish yellow pus, covering foul smelling granulations and débris. An abscess of the neck was emptied. Recovery took place. A year later œdema of the larynx and diabetic coma was followed by death. The term "diabetic ear" should be limited to those beginning with primary osteitis of the mastoid, or with simultaneous tympanic and rapid mastoid involvement. M. TOEPLITZ.

52. The features of *Richardson's* case of a girl, fourteen years of age, were the occurrence of mastoidal inflammation after a non-perforative inflammation of the middle ear, the rapidly occurring and extensive œdema of the soft tissues, the presence of extensive granulations in the antrum and zygomatic cells and the presence of all manifestations of osteo-myelitis without the typical temperature curve.
M. TOEPLITZ.

53. There is a certain degree of value in the method in a relatively small number of cases. It is attended with no small degree of danger, and should be employed only after every other means of establishing the patency of the tube has been tried and failed. The most scrupulous attention to antisepsis is essential, as also the greatest gentleness. In the majority of cases the process is not a true electrolysis.
M. TOEPLITZ.

NERVOUS APPARATUS.

54. ALEXANDER. Problems in the clinical pathology of the static organs. *Bresgens Sammlung* viii, 3. *Antrittsvorlesung*.

55. VON FRANKL-HOCHWART. On the diagnosis and prognosis of Ménière's symptom complex. *Jahrbücher für Psychiatrie und Neurologie*, vol. xxv., p. 245, 1905.

56. SUGAR. On Ménière's disease and its treatment with the galvanic current. *A. f. O.*, vol. 63, p. 217.

57. ZERONI. On the pathology of the internal ear. *A. f. O.*, vol. 63, p. 174.

58. STENGER. On the forms of neurosis following injuries to the head. The traumatic labyrinth neurosis. *Deutsche med. Wochenschr.*, No. 2, 1905.

59. BÜRKNER. On the treatment of nervous ear diseases. *Deutsch med. Wochenschr.*, No. 3, 1905.

54. Starting from Flourens' discovery of the physiological dualism of the internal ear and its clinical application by Ménière, the author is of the opinion that the term, Ménière's symptom complex should be substituted for Ménière's disease. Very probably the case originally reported by Ménière of hemorrhagic exudation into the labyrinth was no primary disease but of leukemic nature, so that the term Ménière's disease is improper. There are diseases of the static part of the labyrinth with and without Ménière's symptom complex. The diagnosis of these diseases can be aided by examination in the following groups of diseases: a. All cases in which the triad of Ménière's complex appears. b. Cases of the so-called pseudo-Ménière type of von Frankl-Hochwart, consisting in the presence of two of Ménière's symptoms, vertigo and vomiting with

an absence of the third symptom (disease of the acoustic labyrinth). c. Purulent inflammation of the internal ear. d. Traumatic injuries of the auditory organ, as well as the cases of progressive deafness consisting in diseases of the acoustic labyrinth or of the labyrinth capsule. e. Cases of congenital or acquired deafmutism.

Alexander discusses the diagnosis of these various groups and shows in what way the diagnosis of diseases of the static labyrinth can be developed. The diagnostic aids can be divided into: a. Those which record the results of the previously observed cases of Ménière's and the pseudo-Ménière symptom-complex and labyrinth suppurations. b. From the results of experimental physiology of the static labyrinth. c. From the examination of animals with congenital anomalies of the labyrinth. d. From examinations of deaf-mutes.

BRÜHL.

55. Two hundred and eight cases of personally observed Ménière's vertigo are described. These are especially of value because it was possible in 80 cases to obtain the subsequent course of the disease for years. Most of these have been examined later by the author. In the introduction the author states that the division originally proposed by him was now generally being accepted. He speaks of Ménière's symptoms only in a general sense. These may appear in an apoplectic form (Ménière's disease according to some authors) or they may be added to previously existing ear diseases. Four typical cases of the apoplectic form are reported. In two additional cases, in one the facial nerve, in the other the sensory fifth nerve, were affected. Then the apoplectic-traumatic cases are described. In three caisson hemorrhages preceded the attacks, in ten severe traumatisms to the head.

As an introduction to the next chapter the symptom vertigo is first discussed, and the differential diagnosis of the aural vertigo is given from that of other forms. Examples are given to show that the danger of confounding this condition with brain tumor is not so great as would seem probable. Ménière's symptom-complex resembles tabes only in the ataxia, though it must not be forgotten that in tabes there are frequently labyrinth symptoms with vertigo, as is shown in seven new cases. The differentiation from arterio-sclerotic vertigo is more difficult, as old persons suffering from arterio-sclerosis are often deaf and frequently suffer from apoplectic attacks. The possibility of differentiation is illustrated by two cases. Then the polyneuritis cerebri menieriformis is described.

The first case of this disease has been described by the author, which was followed by reports from others. It is characterized by an acute facial paralysis with paresis of the acoustic nerve, rotation vertigo, tinnitus, vomiting with not infrequent intercurrent trigeminal symptoms. The other reports treat the relations of Ménière's vertigo with neurosis. The term pseudo-Ménière is fully discussed. According to the author, this consists in attacks of vertigo, tinnitus and vomiting in patients with healthy ears. These are either epileptic aura or epileptic equivalents, possibly hysterical attacks. New examples are added from literature and personal observation in support of this statement. Of interest is the observation that a nervous woman suffered from the symptoms of apoplectic Ménière's symptom-complex with which her husband had been attacked. The relations to hemicrania are still unclear. The possible neurasthenic pseudo-Ménière form is described by only one case.

It is quite possible that Ménière's and epileptic attacks should be associated. The differential diagnosis is more difficult in the traumatic hysteria with sensible sensory hemianæsthesia because in the latter a true labyrinth affection is simulated.

Finally the very unusual "*formes frustes*" are described. The author diagnosticated in one case true aural vertigo in a person with normal hearing. Several weeks later distinct symptoms of a severe right-sided middle ear disease set in. It is also shown that the widespread opinion that the disturbances of hearing must necessarily be pronounced is not always correct because there are also cases in which the hearing is affected only to a slight degree. The vertigo generally presents the symptoms of an intense rotatory sensation. There are also cases in which there is a certain sense of coma. A number of cases are also added to show that the subjective noises may be absent.

As regards the prognosis of vertigo, the author has been able to get exact results with the aid of the above described method. In regard to the apoplectic-traumatic cases, the improvement was marked. Conditions were examined in which the vertigo appeared after a previous middle ear or labyrinth affection. As a minimum period of observation for the duration of the disease, two years are given. Forty patients were cured as regards vertigo, 21 improved, 13 unchanged. The hearing was usually unchanged, in one case diminished. Improvement in the subjective noises was generally of no consequence.

In a short final note on the treatment, the author warns against exaggerated local therapy. The most important means of treatment are complete rest, residence in high latitudes, small doses of bromides and iodide of potash, galvanization of the head and lukewarm baths.

ALEXANDER.

56. Sugar explains this disease in a very convenient manner by the following hypothesis: the conditions of pressure and density and their changes, to which the labyrinth fluid is exposed and the influence of the spongy spaces which extend to the endosteum apparatus cause perforations through this delicate membrane, so that in some cases the perilymph of the labyrinth instead of the bony capsule separates the newly-formed spongiosa from the lymph-spaces. These perforations produce Ménière's disease in its mild or severe form. In the treatment the use of galvanic electricity is recommended.

HAENEL.

57. The specimen was obtained from a man sixty-seven years of age, who had died from hypostatic pneumonia after erysipelas. The patient had suffered for many years from a left-sided otorrhœa, and ten weeks before death had been taken with severe attacks of vertigo. At this time a left-sided facial paralysis was also observed. Six weeks before death the radical operation was undertaken, and a cholesteatoma was found in the antrum, with a large defect in the horizontal semicircular canal and the facial nerve in the cavity. Microscopically the facial nerve, so far as it was exposed, was converted into cellular connective tissue, no separation of the nerve segments, with scarcely a nerve fibre to be recognized. The facial canal and horizontal semicircular canal showed no signs of a distinct destructive process in the bone. In the defect to the horizontal semicircular canal, new bone had been formed with correction of the defect. In the horizontal semicircular canal the granulation tissue had extended to the ampulla, the membrane structures are for the most part destroyed. The same conditions were observed in the posterior semicircular canal. The injury to the facial may have been the result of the pressure of granulation tissue or inflammatory processes. It was directly caused by the extensive destruction of its bony wall. The new formation of bone in the horizontal semicircular canal shows the regenerative power of the labyrinth capsules. The membranous labyrinth was destroyed by the proliferating granulations, though the semicircular canals showed no

inflammatory changes. The facial paralysis had presumably existed for a long time. The difference in the course of the disease of the semicircular canal as regards the onset of vertigo can be explained by the fact that in the cases without symptoms of vertigo there was a previous inflammation of the vestibular nerves, while in the intact nerve vertigo is the result of an irritation of the terminal portion of the vestibular nerve. In this case this irritation was produced by the varying amount of blood contained in the granulation tissue, or by hemorrhages into this tissue. HAENEL.

58. In judging the nervous conditions (headache, vertigo, stupor, tinnitus) which so frequently appear directly after, or a certain length of time after, an injury to the head, Stenger is of the opinion that it is important to examine whether there are any objective disturbances which point to an alteration of the labyrinth in its entirety or in one part. If this is correct, we should not speak of a traumatic neurosis—it is more properly a traumatic-labyrinth neurosis. For the proper examination of the injured terminal, it is absolutely necessary that an exact functional examination of the ear should be made. NOLTENIUS.

59. This is evidently a lecture designed for general practitioners and students. The various conditions such as hyperemia, anemia, hemorrhagic inflammations of the labyrinth and Ménière's disease are described. Finally the nervous tinnitus and otalgia, or more properly the neuralgia of the tympanic plexus, are treated. In the treatment the author believes that the primary disease should be treated in the first place, making the local treatment secondary. NOLTENIUS.

NOSE AND NASOPHARYNX.

a.—GENERAL PATHOLOGY.

60. CHORONSHITZKY. On nasal packing. *M. f. O.*, No. 1, 1905.
61. IMHOFER. The after treatment of nose operations. *Zeitschr. f. Heilk.*, 1904, Book ix.
62. DIONISIO. The radical method in the surgery of the turbinals. *Arch. internat. d' Otolgie*, etc., vol. 19, p. 91.
63. PYNCHON. Some improved nose, throat and ear instruments. *The Laryngoscope*, February, 1905.
64. WILCOX. Post-operative nasal hemorrhage; calcium chloride; secondary anæmia; rapid recovery. *American Medicine*, March 18, 1905.

65. NEWCOMB. The employment of mucin in atrophic conditions of the nose and throat. *Annals of Otolaryngology and Rhinology*, December, 1904.

66. GOODALE. A contribution to the study of the secreting mechanism of the nose. *Annals of Otolaryngology, Rhinology and Laryngology*, March, 1905.

67. COFFIN. The development of the accessory sinuses of the nose. *Amer. Journ. Med. Science*, February, 1905.

60. The author recommends for packing the nose in hemorrhages the introduction of iron-chloride cotton, which has at present been generally abandoned. He introduces the packing immediately after each operation, and removes it after twenty-four hours. After treatment is unnecessary. The patient is discharged after removal of the tampon, and he has never observed any untoward results. After galvanocautic of the mucosa the author recommends this same form of packing in order to prevent the hemorrhages which are not at all rare. Recently he has also used ferripyrin cotton (5-20%), which is less painful and less caustic. PIFFL.

61. The author objects strenuously against the cruel after-treatment to which patients are subjected after a nasal operation. Packing the nose is only necessary after operations on the bone, and to control the bleeding, in addition to packing he uses penghawar cotton, ferripyrin, and gelatin.

The simultaneous use of cutting instruments and caustic is not advisable. In general the after-treatment should be dry, especially with iodoform powder, later with other powders. After the galvanocautic of the lower turbinal, which is followed regularly by the application of trichloroacetic acid, xeroform seems to have acted well. The entrance is closed with cotton in this dry treatment, as the best prophylaxis against inflammation of the ear. PIFFL.

62. This is a short review of the methods for the removal of turbinal hypertrophies. For packing a drainage tube is inserted which has been surrounded with gauze. OPPIKOEFER.

63. 1. For removal of submerged tonsil, three sickle shaped knives, right and left, for dissection of anterior and posterior pillars, and two separators, right and left, for dissection from posterior attachment. 2. Modification of Sloane's snare, whereby a short wire loop can be used; the écraseur nut is enlarged and provided with projecting points. 3. Tonsil tenaculum. 4. Tonsil presser. 5. Tonsil hemostat of horseshoe shape, with a hard wood button and oval cup, filled with cotton. At the external end is a metal pad

with screw adjustment. 6. Adenoid curette, a small ring knife with cutting edges at either side. 7. Nasal speculum, not a substitute for Pyncheon's speculum, but intended for special cases; it has narrower blades and an outer horn to hold up flabby tissue and a set screw to prevent its being opened beyond a desired point.

M. TOEPLITZ.

64. A man, aged twenty-five, was operated on the right side of the nose, through removal of anterior half of middle turbinal and a small spur, under cocaine and adrenalin, by means of snare and saw. Profuse hemorrhage on the fourth day was checked; oozing from posterior nares on fifth day, vomiting of blood on sixth day. On removal of packing from posterior nares profuse hemorrhage ensued, another on the seventh day. Calcium chloride, 2.6 grammes, was given. The patient was exsanguinated; anæmic murmurs in supraclavicular fossa. Blood: hemoglobin 40% ; red corp., 1950000; white corp., 7730. Oozing of blood from posterior nares and vomiting of blood continued on eighth day. Calcium chloride was repeated. The bleeding gradually stopped, the plug was removed on thirteenth day and convalescence thoroughly established three weeks after operation. In addition to calcium chloride, solution of iron vitellin was given.

M. TOEPLITZ.

65. Mucin is used in the "soloid" tablets composed of four and a half grains each of the mucin and the bicarbonate of soda, and one grain of menthol. One tablet is dissolved in half an ounce each of sterile water and sterile lime water. This solution is somewhat mucilaginous and is best preserved by adding thymol in the proportion of about half a grain to the ounce. Fresh solutions are preferable and should be applied on a cotton swab.

M. TOEPLITZ.

66. GOODALE reviews the present knowledge on secretion of the nasal mucous membrane and adds the results of personal investigations. The nasal fluid is composed of the secretion of the mucous and serous glands together with a definite proportion of fluid transuded through intercellular spaces of the mucous membrane, mingled with a varying amount of mucus derived from degeneration of epithelial cells together with leucocytes and cellular detritus. External cold adds by condensation a varying amount of water exhaled from the lower respiratory passages. Under pathologic conditions the glands and canaliculi become altered. In chronic rhin-

itis there is a heightened proliferation and mucous degeneration of the cells of the mucous glands without a proportionate increase in chronic hypertropic rhinitis. In atropic rhinitis the glands are diminished and there is an entire absence of canaliculi in the basement membrane suspending the transudation of fluid. In vasomotor rhinitis there is an increase of the canaliculi in proportion to the severity of the symptoms with a possibly heightened secretion from the serous, not from the mucous glands. M. TOEPLITZ.

67. COFFIN draws the following deductions from his own experience in the examination of skulls of infants and stillborn from the sixth month on, and from a review of the literature on the subject.

1. But two of the accessory sinuses are present at birth, viz. ; the ethmoidal cells and the maxillary antrum. 2. The ethmoidal and the antrum are constant sinuses. 3. In infancy, the antrum does not occupy the same relative position in regard to the orbit as in later life, and cannot be reached or entered by the usual methods ; neither can this be done, or satisfactory drainage effected, until after the descent of the second or permanent teeth with the destruction of a tooth socket. It makes impossible also the antral route to the ethmoidal and sphenoidal sinuses during this period of life. 4. The sphenoidal sinus makes its appearance shortly after birth and may be found as a distinct cavity as early as the end of the first year. Practically it may be considered as the most posterior of the posterior ethmoidal cells. 5. The frontal sinus is not present at birth. It appears first in the orbital plate of the frontal bone between the end of the first and the beginning of the third year. Practically at this time it is the most anterior of the anterior ethmoidal cells. Its appearance in the vertical position is from the third to the sixth or seventh year. The accompanying figures illustrate the stage of development of the various sinuses at different ages from the six month fetus to the adult. M. TOEPLITZ.

b.—OZENA.

68. SISEMSKI. On the serum treatment in ozena. *Russkij Wratsch*, No. 30, 1904.

68. Two cases of ozena are reported which have been treated with anti-diphtheritic serum. In one case which showed a marked improvement the subsequent course could not be followed. The second case recovered. SACHER.

c.—TUMORS.

69. BROECKAERT. Ethmoidal endothelioma. Contribution on the surgical treatment of malignant tumors of the nose. *La Presse oto-laryngologique Belge*, 1905, Book 3.

69. This endothelioma of the ethmoid bone had produced exophthalmos and marked swelling of the face. In the nose there was an irregular, nodular, easily bleeding tumor growing from the superior meatus of the nose. BRANDT.

d.—SEPTUM.

70. BAUMGARTEN. Hematoma of the septum, their course and some methods of treatment. *Wiener klin. Rundschau*. No. 13, 1905.

71. SCHIRMUNSKI. On the operative treatment of deviations of the nasal septum. *M. f. O.*, No. 10, 1904.

70. Constant pressure is exerted with carbolated cotton. Among forty cases which were treated in this manner an abscess developed in five. The average duration of treatment consisted in seven to ten days.

The same treatment is followed in perichondritis and abscess. If there is no change after three or four days an incision is made.

WANNER.

71. This is a method devised by the author whereby the septum is divided by a forceps cutting in a crucial fashion. The septum is then retained in its normal position by a compressor and finally by the insertion of metallic tubes. PIFFL.

e.—DISEASES OF THE ACCESSORY CAVITIES.

72. MARTIN. On the significance of occlusion of the ostia in inflammatory diseases of the maxillary sinus, *M. f. O.*, No. 2, 1905.

73. CORDES. On the treatment of chronic empyema of the maxillary sinus. *M. f. O.*, 1905. No. 1.

74. ZIEM. On anosmia, parosmia, and parageusia. *M. f. O.*, 1904, No. 9.

75. GORIS. A contribution to the surgery of the base of the brain. *La Presse oto-laryngologique Belge*, 1905, Book 2.

76. TURNER, A. L. The operative treatment of chronic suppuration of the frontal sinus with special reference to the method of Killian. *Journ. Amer. Med. Assoc.*, February 4, 1905.

77. MUNRO, J. C. Psammoma of the maxillary sinus. *Med. News*, March 4, 1905.

72. Three cases of acute empyema of the maxillary sinus are reported, in which, after puncture had been performed through the lower meatus, irrigation was not possible. The cases recovered after

a very short time. According to the author, this favorable action was due to the restoration of the normal atmospheric pressure in the closed-off and hyperæmic maxillary cavity, and he recommends that the maxillary sinus should be opened from the inferior meatus if there is a suspicion of incomplete ventilation of the cavity.

PIFFL.

73. The author recommends the Mikulicz-Krause operation in chronic empyema of the maxillary antrum, which consists in introducing a large trochar from the inferior meatus with subsequent irrigation and insufflation of iodoform powder. After the discharge is diminished the cavity is to be treated dry. According to the author's statistics, of 36 cases 83. 3% were permanently cured.

PIFFL.

74. ZIEM describes the frequent combination of anosmia and subjective kakosmia with diseases of the accessory cavities, especially of the maxillary antrum. The many interesting features of this paper are not suited for a short review.

PIFFL.

75. A child of eleven years of age was operated upon for a chronic empyema of the sphenoidal sinus by removal of the middle turbinal and exposure of the neighboring cells whereby a fistula was found which led into the cranial cavity. The floor of the sphenoidal cavity was healthy. The process was situated between the ethmoidal and sphenoidal bones. Twenty-four hours later there was a sudden rise of temperature to 43.3 °C., hiccough, rigidity of the neck, the pupils were dilated and immobile, pulse 104, unconsciousness and paralysis of the sphincters. To expose the focus the external nose was retracted as for resection of the superior maxilla, the soft parts of the orbital cavity were separated from the inner wall and the ethmoid was resected, exposing the sphenoidal cavity. The outer and the upper wall of this cavity were removed until underneath the chiasm. A piece of gauze was introduced through the nose; the wound was sutured. On the following day a large quantity of greenish pus escaped from the nose. The temperature then dropped, with the restoration of consciousness and all symptoms were improved. Three days later death from meningoencephalitis.

BRANDT.

76. TURNER brings the total number of intra-cranial frontal sinus complications up to forty-two. He holds that intranasal treatment cures but a very small number of cases, and that it should

be carried out as a preliminary to an external operation on the sinus. The Ogston-Luc operation through the anterior wall fails to reach recesses of the operated sinus, a communication between the two sinuses and the anterior ethmoidal cells, which are implicated in 62%, and thus resulted in a percentage of only 58 successful operations. Of the 67 cases operated by the Kuhnt operation, in which the floor is also removed, a cure was effected in all but one. Of the 24 fatal cases, 17 (74%) occurred after the Ogston-Luc operation (in 15 after a single, in 2 after more than one operation); in 6 radical operations 3 were secondary after simple opening, so that multiple operations seem to exercise a detrimental effect. The disfigurement is smaller in the Luc method, which is less curative. Osteo-plastic operations give good cosmetic, but doubtful curative results. Killian's operation, which removes the anterior and inferior walls and the frontal process of the superior maxilla and leaves the supraorbital bony ridge, gives access to the entire cavity, recesses and ethmoidal cells and nasal cavity, with a minimum of disfigurement and almost complete obliteration of the sinus. Of 29 cases thus operated, 26 (83%) were cured. M. TOEPLITZ.

77. A woman, about twenty years old, had noticed in her fourteenth year that the left eye was a little more prominent than the right. This became more marked, and now it is a disfigurement. Left eye shows marked proptosis, lids close with difficulty, and the apex of left cornea is 2 *mm* anterior to that of the right eye. The movement is limited, 50° less than normal. The eye could be drawn back and upward. Palpation revealed a smooth, rounded mass in lower part of orbit, beginning at the infraorbital ridge and running up and backward; the bulk of the mass was back of the equator of the globe. The ridge of the orbital floor was not involved. Laterally the mass extended to the side walls of the orbit at the level of the canthi. Kroenlein's operation for exposing the orbit was carried out. A slightly fluctuating tumor was found lying behind, below and to the outer side of the globe, and on chiselling the outer wall of the orbit, a large cyst-like tumor was encountered, full of gritty material, feeling like a mixture of sand and putty. From an opening through the mouth into the antrum a drachm of puriform mucus escaped, but above it there was the same gritty material. Inner surface of the wall felt rough. After dressing, oedema and foul discharge persisted; convalescence

was unsatisfactory. Second operation, two months after the first: Left common carotid closed by clamp. The antrum was free from growth. A fulness was felt posterior to upper jaw. The anterior wall of the latter was removed as far as the infraorbital foramen. The hard tumor in the roof of the pharynx was psammomatous and similar to that found on first operation. More growth was found in the sphenoidal and ethmoidal cells of both sides and around the left lateral wall of the nasal cavity which was removed. The vomer, pushed to the right, was not involved. The tumor was also on the upper surface of the palate, which was normal. The growth extended to the frontal sinuses, not involving them. No recurrence in orbit, rapid convalescence. The tumor looked like fine sand soaked with blood; it effervesced with hydrochloric acid, the granules did not dissolve, but were easily separated. It was decalcified in sulphuric acid. The calcareous bodies separated by tissue consisted of spindle cells without intracellular substance, nodules 50 to 70 *mm* in size, concentric, close together. Diagnosis; Psammoma, possibly sarcomatous. No evidence of return after sixteen months; exophthalmus still persisted. M. TOEPLITZ.

f.—OTHER DISEASES OF THE NOSE.

78. HENLE. On the treatment of acute coryza. *Deutsche med. Wochenschr.*, No. 6, 1905.

79. BAUMGARTEN. Periodic hemorrhages from the upper respiratory passages. *Arch. internat. d'Otologie*, etc., vol. 19, p. 31.

80. WOLFF. On the connection between fibrinous rhinitis and diphtheria. *Deutsche med. Wochenschr.*, No. 2, 1905.

81. HALASZ. A case of rhinolith and consecutive purulent otitis media. *A. f. O.*, vol. 63, p. 214.

82. GOLDMANN. A case of necrosis of the lower turbinal and of the ethmoid bone. *Prager med. Wochenschr.*, 1904, No. 26.

83. COHN. On congenital atresia of the choana. *M. f. O.*, No. 11, 1904.

78. HENLE has experimented upon himself and a number of patients suffering from acute coryza with the congestive procedure of Bier, and has observed excellent results inasmuch as all the patients were almost momentarily relieved of the unpleasant symptoms (pressure in the head, a sense of irritation, lachrymation, and so forth) and on the following day recovery occurred. In only one case of chronic coryza the treatment was of no avail, possibly be-

cause it could not be practised in the proper manner. The congestion was produced by a rubber tube for 2-5 hours, the pressure never rose over 25 mm. The treatment is not adapted for persons with arteriol sclerosis.

NOLTENIUS.

79. A review of the periodic hemorrhages occurring from the upper respiratory passages. The author makes the following divisions: 1. Hemorrhages before the onset of menstruation. 2. Hemorrhages in place of menstruation. 3. Hemorrhages during menstruation. 4. Hemorrhages during pregnancy. 5. Hemorrhages of the menopause.

OPPIKOFER.

80. WOLFF has observed three boys who suffered from a disease known as fibrinous rhinitis though they were otherwise in perfect health. In each true diphtheria bacilli were found present. The sister of the first boy was taken ill a short time later from severe diphtheria of the throat. In the latter patient diphtheria bacilli were also found in the tonsil membranes. The author therefore opposes the frequently expressed view that fibrinous rhinitis is a harmless disease and that the diphtheria bacilli found in this and similar cases where severe constitutional symptoms are absent are only accidental parasites. He is of the opinion that in almost all cases of fibrinous rhinitis diphtheria is the cause and that these patients, notwithstanding the absence of fever and undisturbed general health should be regarded as suffering from diphtheria and treated from this standpoint.

NOLTENIUS.

81. After removal of a rhinolith 2 cm. long and $1\frac{1}{2}$ cm. broad, the middle ear suppuration which had existed for two months ceased.

HAENEL.

82. A woman, twenty-eight years of age, had suffered after puerperal infection from metastatic inflammation in the frontal bone with separation of two particles of bone, which apparently produced epileptic convulsions. Twelve years later the necrotic turbinal imbedded in the granulations was removed from the right side of the nose. This had produced no symptoms except headache.

PIFFL.

83. This is a careful description of a congenital occlusion of the left choana in a boy eleven years of age. The etiology and the symptoms of this anomaly are then given.

PIFFL.

g.—NASOPHARYNX.

84. DÖLGER. A remarkable case of acute inflammation of the pharyngeal tonsil. *M. f. O.*, No. 9, 1904.

85. ESCAT. The result of a too thorough curettage of the nasopharynx after removal of adenoid vegetations. *Arch. Internat. d' Otolgie*, vol. 19, p. 40.

86. LAVAL. Malignant tumors of the nasopharynx. *Arch. Internat. d' Otolgie*, vol. 19, p. 55.

84. A soldier, nineteen years of age, suffered from toothache. This was followed after a few days by headache, pain in the left half of the head, lachrymation, difficulty in swallowing, and fever. The fever disappeared, but the headache became more intense with insomnia, loss of appetite and finally symptoms of intracranial complications, viz., subnormal temperature with slow pulse, vomiting and vertigo. The cause of these symptoms was found to be a severe inflammation of the pharyngeal tonsil with formation of an abscess. Four weeks later the man was able to return to his work.

PIFFL.

85. The Gottstein operation was undertaken by a non-specialist; the procedure was arduous and protracted. This was followed by an adhesion of the soft palate to the posterior pharyngeal wall. The patient subsequently came into the hands of Escat who divided the adhesion. It was then found that the adenoid vegetations still existed.

OPPIKOFER.

86. Forty-five cases of sarcoma and twenty-seven cases of carcinoma of the nasopharynx are collected from literature. Seven additional cases of malignant tumors of the nasopharynx are added. Operation is recommended by the internal passages, though this procedure is often only palliative.

OPPIKOFER.

MOUTH AND PHARYNX.

87. GENTER. On the pathology of hyperplastic pharyngeal and palatal tonsils. *Dissertation, St. Petersburg*, 1904.

88. HARTMANN. A tonsil curette. *Med. Klinik*, No. 2, 1905.

89. BERGH. A case of nervous symptoms after tonsillotomy. *M. f. O.*, No. 12, 1904.

90. SPICKER. On the treatment of syphilitic lesions of the mouth, of the pharynx, and of stomatitis with concentrated solutions of chromic acid. *Russki Shurnal*, etc., September, 1904.

91. JASSINOWSKY. A case of pyalism. *Wiener klin. therap. Wochenschr.*, No. 8, 1905.

92. BRYANT, ALICE G. A new tongue depressor. *The Laryngoscope*, February, 1905.
93. JARECKY, H. Calculi in Blandin's and submaxillary glands. *N. Y. State Journ. of Medicine*, February, 1905.
94. INGALS, E. F. Tonsillectomy, thorough, painless and safe. *Journ. Amer. Med. Assoc.*, February 4, 1905.
95. INGALS, E. F. Fibrolipoma of the pharynx and larynx. *Amer. Medicine*, February 4, 1905.
96. CARTER, W. W. C. Growth of bone in the tonsil. *Medical Record*, February 4, 1905.

87. The tonsils which were examined were obtained partly from the living and partly from cadavers, thirty-eight cases in all. The examinations showed that the tonsils attained their full development at the 6th month of life, that regressive metamorphosis (connective tissue hypertrophy) appears macroscopically in the 40th year, though it can be recognized with a microscope in the 20th year. The hyperplastic tonsils differ only in their unusual size and the pronounced hyperæmia. In hyperplasia of the pharyngeal tonsil proliferations of the lymphoid or the connective tissue may be recognized in the earlier age; later the distinction between these two becomes more difficult on account of the transformation of the primary connective tissue into lymphoid tissue. The development of cartilage into connective tissue of the tonsils is not a remnant of the bronchial arches, but develops from the fibrinous connective tissue.

SACHER.

88. The tonsil curette consists of a metal shell and serves to clean the tonsils for diagnostic and therapeutic purposes. The writer has employed this instrument almost daily for many years. He was astonished to find how much could be expressed out of the tonsils, sometimes a sero-purulent fluid, occasionally cheesy masses and so-called tonsillar concretions.

The expression of the tonsils takes place by pressure on the anterior palatal arches, especially on the upper part, because in this region fluid and concretions are most frequently found. On exerting pressure the yellowish sero-purulent fluid or the thick mass appears on the surface and is expectorated by the patient. Pressure may be exerted also in other directions. In the case of round tonsils and during contraction of the pharyngeal muscles the tonsil curette is apt to slip, causing an unpleasant sensation to the patient, which is, however, not of any importance. Small extravasations of

blood may occur. It is remarkable how quickly tonsils are reduced in size after expression.

AUTHOR'S REVIEW.

89. In the case of a nervous but well developed girl of seven years of age, both the palatal tonsils and the pharyngeal tonsils were removed at one sitting. After the removal of the first palatal tonsil severe retching with convulsive retraction of the thighs occurred, lasting from three to four minutes. Three hours after the operation was ended another small attack occurred, associated with hemorrhage from the nose, and was repeated in the next hours with profuse hemorrhages, so that the child became very anæmic. After the local application of styptic remedies the hemorrhages were terminated though the attacks of retching continued for two days. The neuropathic disposition of the child is held responsible for this occurrence.

PIFFL.

90. Applications are made of 10 or 15% solutions of chromic acid by means of the cotton applicators directly to the affected parts. The healthy mucous membrane is not to be invaded. The applications are painless. They do not cause any poisonous symptoms and should be applied two or three hours before eating. After the applications are made gargles are given. The results were very good.

SACHER.

91. In a patient twelve years of age hysterical attacks set in, followed after several months by profuse discharge of saliva, which was arrested during sleep.

This is an unusual neurosis, a monosymptomatic variety of hysteria.

The treatment consisted in general neurotonic directions, improvement of nutrition and suggestion. Hydrotherapeutic procedures. After half a year all of the functions were again normal.

WANNER.

92. The tongue depressor is made of steel and measures 24 cm from tip of blade to end of handle. The latter is at an angle of 40°. The curve of the blade and the angle it bears to the perpendicular line brings uniform pressure along the whole surface of the tongue, at the same time drawing it forward at its base.

M. TOEPLITZ.

93. JARECKY reports three cases. Case 1. Calculus in Blandin's duct associated with one in Wharton's duct, very rare, in a man,

aged thirty-four, the first removed with a quantity of pus, the second eight months later. Case 2. Calculus in Wharton's duct, large size stone, six grains, without symptoms, removed from a man, aged thirty-nine, with two drachms of pus. Case 3. Small calculus with intermittent swelling of the submaxillary gland.

M. TOEPLITZ.

94. The instruments required for tonsillectomy are: A mouth gag, tongue depressor, blunt hook, tonsil forceps, long forceps, two snares with wire No. 5, and sponges. The instrument for separating the anterior pillar of the fauces has two blades, which, when closed and locked, form a blunt hook, when opened, separate the pillar from the tonsil by a single movement. The tonsil forceps is about 8" in length, with a catch on the handles. The blades, 1" wide, turning at an angle of 45° to the long axis, are rounded toward the end, which consists of two blunt points, each $\frac{1}{8}$ " wide, separated $\frac{3}{8}$ " from each other by a crescentic depression, leaving an elliptical opening $\frac{3}{8}$ " long and $\frac{1}{4}$ " wide, when the points of the blade are brought into contact. The forceps, 8" long, holds the end of the uvula. The tonsil is removed under a general anæsthetic, the patient being in a prone position. M. TOEPLITZ.

95. A man, aged twenty-eight, had difficult breathing, swallowing and a muffled speech. A large tumor, apparently a fibroid, nearly filling the laryngo-pharynx, was for the greater part removed with écraseur, and the remaining nodules were cauterized. The first part was fibrous, the latter fatty. Size 4.5 : 3×8 cm. After five and a half years a large mass extending from the base of the tongue downward to the arytenoid cartilage, attached by a broad base to the right side of the pharynx, and also the right edge and anterior surface of the epiglottis was filling $\frac{3}{5}$ of the laryngo-pharynx, 5 cm long and standing out 2.8 cm from the wall of the pharynx. After pulling the first part of the tumor out, the patient was choking and tracheotomy had to be performed. The remaining portion of the tumor was removed under cocain with a wire loop. It measured $3\frac{3}{4}$: $3\frac{3}{8}$ cm. The larynx partially obstructed by a small portion of the tumor, which was removed. A large mass on the right side of the pharynx 2 : $3\frac{3}{8}$ cm remained. The choking was caused by a part of the very movable tumor having fallen through the opening made in the mucous membrane by the removal of the first mass. M. TOEPLITZ.

96. A woman, twenty-two years old, had repeated attacks of tonsillitis, during the last ten years as many as a dozen peritonsillar abscesses, most of which on the left side, the last a month ago ; between the attacks the throat had never felt well. The tonsils showed signs of acute inflammation, dense fibrous masses, slightly larger than normal and firmly adherent to the pillars. The right tonsil was removed with the tonsillar punch. The left could not be grasped with it, owing to a solid mass contained therein, which was freely movable, not attached to the bony skeleton and was removed with long scissors. It was $\frac{3}{4}$ " long, $\frac{1}{2}$ " wide, $\frac{1}{4}$ " thick. From a study of the microscopical examination made by JONATHAN WRIGHT and illustrated by two pictures, and from an extensive analysis of the cases reported by others, CARTER is inclined to believe that the bone originates from metaplastic changes in the connective tissue, and not from the bronchial arch. M. TOEPLITZ.

ARCHIVES OF OTOTOLOGY.

CIRCULATORY DISTURBANCES FOLLOWING LIGATION OF THE INTERNAL JUGULAR VEIN IN SINUS THROMBOSIS; WITH REPORT OF A CASE.¹

By WELLS P. EAGLETON, M.D., NEWARK, N. J.

CASE. Boy, aged nine years; scarlet fever five years ago, followed by left otitis media purulenta; after subsidence of which, fair-sized dry central perforation of membrana tympani, which had discharged several times, and then would become absolutely dry, and so remain for several months at a time.

On March 8, 1905, slight pain, redness, and tenderness over mastoid, accompanied by very profuse discharge. Temperature 100° F., vessels of left optic disk rather full. Admitted to Newark Eye and Ear Infirmary for operation. Following day all mastoid symptoms had disappeared, discharge much less, follicular tonsillitis, although no complaint of throat. Perfectly well in three days. Five days later (March 17th), sudden dizziness and rise of temperature to 104°. Ear discontinued discharging; no tenderness over mastoid. Temperature rapidly fell again to normal, and patient appeared to be perfectly well. Same sudden rise of temperature repeated on following day, when again admitted to Infirmary. Following day temperature 104°, which fell in five hours to 100.2°, and rose again in five hours to 103.4°, and again fell in six hours below normal, 98.1°.

Blood examination showed numerous plasmodia malarix. Quinine given in large doses, nevertheless on following day again a sudden rise.

During this time three things were noticeable: First, the

¹ Read before Section of Otology, N. Y. Acad. Medicine, Jan. 11, 1906.

excellent condition of the patient, he insisting at all times that he was perfectly well ; objected strenuously against being confined in bed, and, despite the sudden changes in temperature, only complained twice of dizziness and "feeling tired."

Second, the absence of chills, although the nurse on one occasion, during a rise of temperature, noted a very slight and transient blueness of the lips.

Third, the complete absence of all mastoid tenderness.¹

Operation, March 21st.—Mastoid absolutely normal ; no bleeding from diploic veins. Sinus exposed at knee : normal appearance, but blackened well down towards bulb, and small opening in wall very low down through which drop of pus oozed.

Jugular ligated, and this immediately followed by a profuse flow of blood from upper wound, both from soft parts and bone. On passing probe into opening in sinus, profuse hemorrhage, which was not controlled by pressure from above. Free bleeding thought to come from below. Firm tamponage necessary to control hemorrhage.

Following day general condition good, but *marked double optic neuritis, although none had been present one-half hour prior to operation*; chilly sensation, rather restless.

March 23d.—Temperature 100° – 103.4° ; pain in back of neck on moving eyes ; retinal veins enormously dilated and tortuous, arteries small. Numerous hemorrhages in retina. Blood pressure 130mm. Ether given ; again very profuse hemorrhage, supposed to come from below as well as above. Very firm tamponage necessary to control.

March 27th.—Intense optic neuritis. General septic condition: temperature 102° – 104° ; chill; *veins over whole of scalp and upper part of chest very much distended.*

March 29th–30th.—Delirious at times ; great restlessness ; temperature 99.3° – 105° .

March 30th.—Ether given; whole length of sinus split; bleeding from below found to come from enlarged emissary entering very low down towards the jugular bulb.

Whole of ligated jugular excised, the upper portion being bathed in pus, the portion below the ligature filled with a firmly organized non-septic clot which extended downwards behind clavicle.

¹ In a general way the case fits the type of primary jugular-bulb thrombosis in infants, described by McKernon, *Trans. Am. Otol. Soc.*, 1905.

April 1st-5th.—Almost constantly delirious, sang a few bars of a doggerel song over and over again; involuntary urination; pulse irregular; great restlessness at times; temperature 99.2° – 102.4° ; apparently has meningitis.

April 7th.—General condition very much improved, but can see very little, only able to count fingers at few feet. The enlarged veins in the scalp have felt like irregular cords under the finger, as if filled with firm thrombi, but now are gradually disappearing. Has had two lumbar punctures during past week. Fluid clear, under pressure, microscopical examination negative, first puncture apparently improved vision somewhat. Great difficulty has been experienced in changing dressings because of the hemorrhage which succeeded any disturbance of the firm packing.

April 10th.—Totally blind; pupils dilated, no reaction to light. All pressure removed from sinus; veins in scalp gone.

April 28th.—Suddenly in the middle of the night, while sleeping, profuse venous hemorrhage.

April 29th-30th.—Very free discharge of clear cerebro-spinal fluid, escaping from small opening in inner wall of sinus. Dressings soaked several times daily.

May 4th.—Hernia cerebri. During the next month, symptoms of cerebellar abscess, irregular projectile vomiting, vertigo, loss of co-ordination of left side of both arm and leg, but chiefly of arm. Deviation of tongue, but no loss of flesh.¹

During this time the cerebellum was twice explored; nothing found.

June 6th.—Rapid rise in temperature; delirium; inability to swallow; collapse; death.

Report of Autopsy, by Dr. Charles Teeter:

“Nothing abnormal was noted over the surface of the brain. The optic nerves and vessels were cut and the medulla divided and the brain lifted out. It separated easily except at the site of the hernia cerebri, which was the left side of the cerebellum.

“On opening the sinuses, the left lateral, the torcular, the inner one-fourth of the right, nearly the whole of the superior longitudinal, were all thrombosed. The cavernous and the petrosals were normal.”

¹ This argued very much against the existence of an abscess, as in my experience recent cerebellar abscess is invariably associated with rapid loss of flesh.

"The hernia cerebri involved nearly the whole of the left lateral lobe of the cerebellum; extending from it was an area of softening involving the left lateral portion of the pons.

"Two specimens were taken for microscopical study, one the lateral portion of the pons and the other the medulla. The specimen taken from the medulla, on cross-section in its upper part, showed in the median line of the floor of the fourth ventricle a hemorrhagic area extending inwards and slightly to the left. The floor of fourth ventricle showed microscopically extensive round-celled infiltration. Medulla: Both specimens show evidences of rather extensive meningeal inflammation."

Examination of the wet specimen of this dura several months later showed the free right lateral sinus to be only about one-half the size of the thrombosed left lateral sinus. No measurements of the size of the jugular foramen were made.

This unfortunate case possesses many points of interest, chief among which are the great disturbances in the cerebral circulation, following the ligation of the jugular, as evinced by the profuse bleeding from the mastoid wound, and the immediate appearance of an optic neuritis of an intense type.¹

The failure to relieve the sepsis even after the second operation was due to inability to manipulate the lower end of the sinus, because of severe bleeding, and the locking in of the septic material by the firm tamponage necessary for its control.

The non-septic thrombosis of the superior longitudinal sinus and the accompanying meningeal symptoms were caused by a stagnation of the blood in the sinus, while the secondary hemorrhage and the escape of cerebro-spinal fluid and development of large hernia were the result of increased pressure and weakening of the dura, through the firm and prolonged tamponaging.

All the conditions thus were, either directly or indirectly, attributable to the sudden disturbances in the cranial circulation by the ligation of the jugular.

¹ The whole subject is very fully and critically reviewed by Schultze: "Über die Gefahren der Jugularisunterbindung und des Sinusverschlusses bei der otogenen Sinusbose." *Arch. f. Ohrenheilkunde*, Bd. 59, S. 216.

It is to this phase of the subject that I wish to call attention.

There was a great mistake made in the handling of this case, viz: the ligation of the jugular, a procedure which is advocated by a majority of surgeons, especially when the bulb or the lower end of the sinus is involved.

In the early days of renal surgery, after the removal of a kidney, a few patients died without having passed urine, and the operators were greatly chagrined at finding, at post-mortem that the kidney that had been removed, although diseased, was the only one present.

The number of such cases will never be known. To-day such a mistake would be inexcusable. And I think it is time that otologists, in view of past experience, cease to advocate and practise the ligation of the jugular in *all* cases of septic thrombosis, without taking all precautions possible to be sure that it will not too seriously upset the cerebral circulation. Furthermore, if ligation is performed, its method and site should have this possibility in view.

I am convinced that such disturbances are not as infrequent as would appear from the scant literature on the subject, due either to omission to report them, or, what is much more probable, failure on the part of the surgeon to recognize the condition, associated as it is so frequently with symptoms indistinguishable from those of meningitis.

What evidence have we that the jugular ligation is attended with danger?

Rohrbach (Bruns, *Beitr. z. klin. Chir.*, vol. xvii., p. 811), in a collection of ninety-one cases of ligation for various conditions, found six presenting symptoms of circulatory disturbances, such as swelling and œdema of the soft parts, with cyanosis of the face, four severe headaches, and three deaths, undoubtedly due to disturbances in cerebral circulation.

G. Fischer observed headache and hemiplegia, which later subsided.

Asmus reports convulsions and opisthotonus lasting twelve minutes.

Winthrop Mitchell, of Orange, N. J., in an unreported case,

observed delirium and unconsciousness, which continued for several days, but completely disappeared.

Berard (*Bull. d. l. soc. chir. de Lyon*, Feb., 1905) reports œdema and swelling of the neck and face.

Richards (*ARCH. OF OTOTOLOGY*, 1905, vol. xxxiv., p. 419) observed transient mania in one case and a secondary papillitis in another.

Rohrbach (Bruns, *Beitr. z. klin. Chir.*, vol. xvii., 1896-7, p. 813) reports a continued semi-comatose condition following the operation for six days, and death. Post-mortem showed the transverse sinus and the jugular of the unligated side had a lumen of the size of a needle and of a quill respectively. In the middle of the right frontal lobe was a softened area of the size of a five-mark piece, and a like spot, the size of a two-mark piece, in the left second frontal convolution; the surface of the brain was also covered with numerous smaller areas, chiefly in the central convolution.

Linser (Bruns, *Beitr. z. klin. Chir.*, vol. xxviii., p. 642) observed delayed return to consciousness for five hours, although relatively a small amount of ether had been given; later, apathetic condition, difficulty in breathing; slow, irregular pulse; slight facial œdema, cyanosis, and death in deep coma on the following day. Autopsy showed hyperæmia and œdema of the brain, the capacity of the ligated jugular being ten times that of the unligated, and while the transverse sinus of the ligated side was of good size, that of the unligated was very small.

Kummer's (*Revue de chirurgie*) patient never came out of the ether; rapid pulse and breathing; death five hours after the operation. Autopsy: Œdema of the brain from effusion from venous hyperæmia, also multiple small hemorrhages and extravasation of blood in ventricles.

Grunert's (Schultze, *Arch. of Ohrenh.*, vol. lvii., p. 29, case Leps) patient never came out of narcosis; slow, strong pulse; difficult breathing; pupils contracted. Later, extreme dilatation of pupil, loss of corneal reflex, and death one hour after operation. Autopsy: Layer of blood covered the whole of the left convexity between the dura and the arachnoid. Infiltration (hemorrhagic) of the brain around the central convolutions.

Hölscher (*Arch. für Ohrenheilk.*, vol. lii., 1901, pp. 111-129). Slow pulse, headache, very severe bleeding from the wound at operation. Three successive operations on second, twelfth, and

twenty-first days respectively. Right pupil dilated, probably the effect of small abscess that was found at post-mortem. Death the result of thrombosis of the superior longitudinal sinus and brain abscess, the patient having recovered from the immediate disturbance of the cerebral circulation.

Grunert (Schultze, case Bosse, *Arch. f. Ohrenheilk.*, vol. lix.): after ligation and obliteration of right jugular and sinus, accidental injury of left sinus, necessitating firm tamponage to control hemorrhage, immediately followed by weak, rapid pulse, labored breathing, pupils widely dilated, unconsciousness alternating with screaming fits which lasted for thirty hours, succeeded by partial unconsciousness for three days, and then a return to normal condition; death from acute tuberculosis later, the post-mortem showing that the left sinus as well as the right had been entirely obliterated by a clot.

While Jensen reports a case of injury to the sinus of the unoperated side, after ligation of the jugular and occlusion of the opposite sinus, with recovery (*Arch. f. Ohrenheilk.*, vol. xxxv., p. 278), and Dangel (Bruns, *Beitr. zur klin. Chir.*, 1905, vol. xlv., p. 495) reports a case of double jugular ligation with only very transient symptoms, he admits, however, that the occipital veins were very large, and both jugulars had been gradually compressed by a tumor prior to ligation.

The post-mortem findings in the rapidly fatal cases following ligation for conditions outside the skull, are general œdema of the brain, with hemorrhages, and later softenings, while in the very few cases in which the jugulars themselves were investigated, the ligated one was found to be of large size, with a small one on the opposite side.

Hemorrhages into the brain and œdema have been frequently observed in fatal cases of sinus thrombosis. Is it not possible that in some of these death was, in reality, due to obstruction of the venous return, the size of the vessels escaping notice?

Dench (*Trans. Am. Otol. Soc.*, 1903, p. 217) reports a case of death from serous meningitis, softening of the cerebellum, and a hemorrhage into the spinal cord, following ligation.

Panse (*Arch. f. Ohrenheilk.*, vol. xxx., p. 54) reports a case of sinus thrombosis, in which the post-mortem examination re-

vealed hemorrhages into the brain, and hemorrhagic softening of the brain substance. In the occipital lobe an area of 7cm filled with hemorrhages, which area extended to temporal lobe. Corpus callosum and striatum infiltrated with hemorrhages.

Streit (*Arch. f. Ohrenheilk.*, vol. lvi., p. 193, 1902): Thrombosis of both lateral sinus and right jugular bulb; softened area in the cerebellum; hemorrhage over the left hemisphere; meningitis and death two days later, without regaining consciousness.

What evidence have we demonstrating the likelihood that one of the jugulars may be too small to furnish a sufficient flow of blood from the head?¹

Linser, in an examination of 1022 skulls, found in 29, or 3 per cent., the jugular foramen so contracted that the vein passing through it could not have been more than $\frac{3}{4}$ mm in size. Of this 3 per cent., $2\frac{1}{2}$ per cent. occurred on the left side and only $\frac{1}{2}$ per cent. on the right side.

Cunningham states (p. 904) the internal jugular vein is sometimes smaller or larger than normal. In either case, compensating changes in size occur in the lateral sinus and the internal jugular vein of the opposite side, or in the external and anterior jugular of the same side. One lateral sinus may be absent or very small.

Knott (*Journal of Anatomy and Physiology*, 1882, vol. xvi., p. 31) states: "The right lateral sinus is very generally the larger, but I have myself met with two instances of its almost complete absence, only a small venous canal $1\frac{1}{2}$ mm diameter following its course as far as the mastoid foramen, through which it disappeared. In four cases out of forty-four carefully examined, the superior longitudinal turned directly into the right lateral, which appeared to be a direct continuation of the other. In these cases the left was only about one-third the size of the right lateral sinus."

Lieutaud has recorded a case of complete absence of the left lateral sinus. McEwen, Körner, Streit, and Panse all record left lateral sinuses so small as to be practically absent. Kasloff and Dumont both observed a jugular foramen hardly large enough to

¹ The whole literature of anomalies of the cerebral sinuses is reviewed by Streit, "Ueber otologisch wichtige Anomalien der Hinsinus, über accessorische Sinus und bedeutender Venenverbindungen." *Arch. f. Ohrenheilk.*, vol. lviii., pp. 85-167.

admit of the passage of a probe; Bairkow, a jugular foramen of 2.2 mm.

In an examination of seventeen skulls, I found the jugular foramen almost entirely absent in one, and in two others greatly contracted by septa.

Zuckerkindl found a right jugular eight times the size of the left; Biddle, a contracted left jugular foramen, and the right so small that a bristle could hardly be passed through it, but the right mastoid foramen was 1 cm in size. In most of the cases in which the jugular is small, the mastoid foramen is large, and in a few cases the transverse sinus goes through it.

With such abnormalities, why are circulatory disturbances almost unknown in sinus thrombosis, for as yet there is no record of a death from this cause, although literature reports at least six deaths from ligation of the jugular for conditions external to the skull?

In the latter, if the jugular ligated happens to be the large one, while the opposite is very small, the collateral venous circulation being suddenly called upon to carry an excessive amount of blood, causes a sudden storing of it within the cranial cavity, which storing may be followed by œdema, or hemorrhage, and perhaps death. A thrombus, on the other hand, is of slow growth, thus giving the sinuses and the numerous smaller veins ample time to adjust themselves for the extra amount of blood which they must carry, so that when the thrombus *does* completely occlude the vessel, little or no disturbance occurs.

Two symptoms were present in the case reported, which should make us suspicious of cerebral venous "storing," viz: severe bleeding from the diplöic veins and optic neuritis.

Prior to ligation, the absence of bleeding should have made us suspect that the thrombus was not completely occluding the sinus, as it has been my experience in all such cases, especially if operated early, that free persistent bleeding from the diplöic veins is a prominent feature, the reason being that by the occlusion these generally little-used vessels and spaces are now fully distended in the attempt to relieve the dammed-up blood in the sinus. The observation regarding

persistent venous bleeding has been made by operators in cases of increased intracranial pressure, but its importance in assisting to diagnose an occluding thrombosis prior to the opening of the sinus has not been called attention to as far as I am aware. In one case of persistent bleeding from the diploic veins, opening the sinus gave, apparently, free bleeding from both above and below, thus excluding, as was thought, a thrombus. The patient died of pyæmia with multiple metastases, and, although an autopsy was not performed, there can be no doubt but that he had a septic thrombosis of, or near to, the jugular bulb.

The second important symptom of venous stasis was the rapid appearance of choked disks immediately after the ligation.

Since Kipp (*Trans. Am. Otol. Soc.*, 1890) directed attention to the importance of optic neuritis as an indication for opening the mastoid, the condition of the fundus has been carefully observed in cases of suppurative otitis, nevertheless it is only recently that the experiments of Cushing and Kocher (*Am. Jour. Med. Soc.*, 1902, p. 375) have demonstrated choked disks to be due to increased intracranial pressure, accompanied by an obstruction of the venous outflow of blood. In these experiments the effect of regulated mechanical pressure on the cerebral circulation was directly seen through a glass window in the head of the animal operated on.

The circulatory disturbances were, first, with slightly increased intracranial pressure, a narrowing of the venous channels. During this stage the symptoms, in the main, were insignificant. If now the pressure was further increased, the venous narrowing gave place to venous stasis and hyperæmia of the cerebral veins. This was associated with choked disk and symptoms of cerebral irritation—headache, vertigo, restlessness, tinnitus, and delirium.

Clinically we have exactly this condition produced by the occlusion of the sinus by a thrombus, or the ligation of the jugular, if the other venous channels are not large enough to take care of the outflow. This explains the varying degrees of the frequency of optic neuritis in the different

pathological lesions, its frequency in sinus thrombosis both before and after operation, in brain tumor and abscess, and its infrequency in meningitis, in all of which latter conditions the intracranial pressure itself must be raised to a high degree in order to produce a vascular condition, which is the primary one in sinus thrombosis. That this is the correct view is further proven by the infrequency of optic neuritis in cavernous sinus thrombosis, where, while there is a much greater *local* storing of blood, there is a much less general cerebral "storing." In one case of cavernous sinus thrombosis observed by me, no optic neuritis occurred.

During recent years I have seen in the work of Drs. Kipp, Seidman, and myself seventeen cases of sinus thrombosis, optic neuritis occurring six times, or thirty-five per cent., in one of which it followed ligation; while in an examination of twenty-nine consecutive cases of epidemic cerebral spinal-meningitis at the Newark City Hospital, optic neuritis occurred but three times, or about ten per cent. Crockett, in seven cases of thrombosis with ligation, noted optic neuritis in four, in two of which it followed ligation; while Sprague refers to a case of total blindness from optic neuritis in a case of thrombosis. Richards records but one case following ligation.

In view of these facts, I think that it is fair to infer that in all cases of sinus thrombosis, the presence of optic neuritis should warn us that the return venous flow is already seriously obstructed, and cause us to be exceptionally careful to add as little further obstruction as possible by our surgical manipulations.

Theoretically there are certain conditions possible in sinus thrombosis which may make the ligation of the jugular dangerous by preventing the return circulation, viz:

When the thrombus does not entirely occlude the sinus, or when the thrombus does not extend fully down to the bulb, the inferior petrosal and condyloid being still patent. In either of these conditions, the ligation may cut off the main return venous channel, as in the case here reported.

When the external jugular is ligated during the operation, a very frequent occurrence because of its course. By this

accident one of the now most important venous channels is destroyed.

When the ligation of the jugular is below the facial, or the facial itself is ligated; a common occurrence. If now several of these occur, and they may all occur, then if the opposite jugular is of small size, cerebral disturbances are apt to follow.

What means can we take to prevent a disturbance of the return circulation?

First, before ligating the jugular, by first making as large an opening as possible in the sinus wall, and beginning this opening as far down toward the bulb without attempting to remove the clot, thus avoiding the possibility of mistaking a parietal for an occluding thrombus, and at the same time reducing to a minimum the probability of disseminating the thrombus.

Second, if the thrombus is, as in the case here reported, situated so low that this is impossible, then the application of a temporary clamp, such as Crile clamp for temporary compression to the carotid, and if now there is no extra bleeding from the diplöic and other small veins it is fair to infer that the circulation has in no ways been disturbed.

Third, by not injuring the external jugular in ligating; and,

Fourth, by ligating above the entrance of the facial whenever there is not a positive indication for a lower site being chosen.

OTITIS INTERNA SINISTRA HEMORRHAGICA (?); VICARIOUS MENSTRUATION (?).

BY EMIL AMBERG, M.D., DETROIT, MICHIGAN.

Mrs. J. Sh., thirty-three years of age, consulted me on November 1, 1905, and gave the following history : There is no deafness in family; she has been married four years; has no children, had no miscarriage, and never any acute trouble with her ears until August, 1905.

On a Sunday (the date is not remembered by her) the patient partook of a light lunch at 11 A. M.: at two o'clock she took a very hot bath in which she remained 20 minutes. From the bathroom she went to the bedroom and threw her hair, which, however, had not been wetted, over her head in order to comb it, at the same time throwing her head forward. When she raised her head up again she felt very dizzy and nauseated, so that she had to lie down on a lounge for $1\frac{1}{2}$ hours. Then she tried to get up, feeling still somewhat dizzy, but she could get supper ready.

Patient had just finished her menses, which lasted for three days and were scanty as usual. A druggist sent some bromoseltzer, but patient vomited after having taken it. During the following night she slept well, but did not notice any improvement the following morning. In the afternoon she rested on a lounge, and when she raised her head she noticed for the first time a noise in her ear which has not left her since. The noise resembles escaping steam. The dizziness and nausea lasted until the following Wednesday.

The patient consulted several physicians and, as she says, was treated by massage of the ear and with medicine by one of them. Patient attributes the disappearance of her dizziness to the

medicine (K I). The dizziness had lasted about $2\frac{1}{2}$ months and was especially noticeable when patient looked upward.

Hearing Test.—A watch ordinarily heard at a distance of 100-150 inches is heard at a distance of about 6 feet in the right ear, and in the left ear at a distance of about $\frac{1}{2}$ to $\frac{3}{4}$ inch. (Patient says that she was a little deaf in the left ear for about ten years.) Low tuning-forks are heard in both ears. Hartmann's 4096 tuning-fork is heard in both ears, but not so plainly in the left ear. Blake's 512 fork is heard in the right ear seven seconds by air conduction and four seconds by bone conduction (over the mastoid); in the left ear five seconds by air conduction and four seconds by bone. Weber is localized in the right ear; Galton, probably 0.0, in both ears. The right hammer is slightly retracted; the right drum membrane shows no light reflex; the left hammer shows a marked retraction, and the drum membrane shows no light reflex. Examination with Siegle's speculum shows the lower portion of both drum membranes easily movable and the upper portion of the left drum membrane hardly movable—otherwise normal.

After treatment with Delstanche's masseur and Lucae's pressure probe, the watch is heard in the left ear at a distance of about $\frac{3}{4}$ to 1 inch.

Nov. 9, 1905.—Gellé's test with Hartmann 128 fork. Right ear, positive; left ear, negative.

Nov. 27.—She reports that she felt very dizzy on the 24th and 25th, especially when raising her head. Menses from the 22d to 25th, inclusive.

Urine examination (Detroit Clinical Laboratory, November 8th).—General appearance, cloudy. Specific gravity, 1.025. Albumin, none. Bile, none. Sugar, none. Indican, slight reaction. Diazo reaction. Iodine reaction present. Microscopical examination: An occasional leucocyte, few squamous epithelia, numerous yeasts, moulds, and bacteria.

Patient appears to be perfectly well in other respects. Syphilis and malaria are denied and do not appear to be present in our patient. The blood examination December 15, '05, shows: Hæmoglobin about 95 per cent.; red blood corpuscles a little less than four millions; leucocytes, 6800—indicating a slight anæmia.

The examination with the galvanic current gives the following results: (Dec. 6, '05, Drs. H. H. Cook and E. Amberg: one

electrode on the tragus, the other in the palm of the opposite hand.)

I.—1½ MILLIAMPÈRES.

		<i>Right Ear</i>	<i>Left Ear</i>
1	Kathode on tragus, current sliding in.	No effect	No effect
2	Kathode opening.	No effect	No effect
3	" closing.	A little dizzy	No effect
4	Anode on tragus, current sliding in.	No effect	No effect
5	Anode opening.	No effect	No effect
6	" closing.	No effect	No effect

II.—3 MILLIAMPÈRES.

1	Kathode on tragus, current sliding in.	A little dizzy at first	Dizzy
2	Kathode opening.	No effect	Dizzy
3	" closing.	No effect	Dizzy
4	Anode on tragus, current sliding in.	Dizzy	Dizzy
5	Anode opening.	No effect	No effect
6	" closing.	No effect	No effect

III.—5 MILLIAMPÈRES.

1	Kathode on tragus, current sliding in.	Dizzy	Dizzy
2	Kathode opening.	No effect	No effect
3	" closing.	Dizzy	Noise more strongly like escaping steam, hissing
4	Anode on tragus, current sliding in.	Dizzy	Dizzy
5	Anode opening.	Dizzy	Dizzy
6	" closing.	Dizzy	Dizzy

Scheppegrell (text-book, *Electricity in Diagnosis and Treatment of Diseases of the Nose, Throat, and Ear*, 1898, p. 324) says: "The easy reaction of the acoustic nerve with currents of one to three milliampères is therefore indicative of an irritable condition of the internal ear or the acoustic nerve, when the objective examination enables us to exclude inflammatory affections of the middle ear."

Althaus (London, England), in an article ("Beitraege zur Pathologie und Therapie des Tinnitus Aurium"), mentions a patient, thirty-five years old, in whom he examined the ear reaction of

the acoustic nerve. Patient suffered, on account of business excitement, from nervous exhaustion, with dyspepsia, constipation, and melancholia. (I should like to call attention to the fact that we should consider a mental condition which is a distinct clinical entity only then as such when the picture is complete and when the clinical course is characteristic. We should avoid calling a condition melancholia if only a few or temporary symptoms are present which may be found present in melancholia.—E. A.) The patient of Althaus awoke one morning with tinnitus and suffered from vertigo when he moved his head. In a few days the hearing decreased. Strychnia, iodide and bromide of potassium, and a rest were temporarily beneficial. The electric examination showed a hyperæsthesia of the left acoustic nerve. Patient was cured by electric treatments.

Frankl-Hochwart (*Der Ménière'sche' Symptomen-Complex. Die Erkrankungen des inneren Ohres*, Wien, 1895) says: "My own numerous investigations have led me to results which come very near to those of Gradenigo. On the normal human being I have never been able to establish a reaction of the acoustic nerve, just as Pollak and Gaertner have not been able to do. According to Gradenigo, the irritation of the acoustic nerve can exceptionally be demonstrated in single individuals with external application of strong currents (6 milliampères). On the other hand, I have not infrequently found a response from the acoustic nerve in people in whom the hearing organ was affected first for kathode closing (1-2 milliampères); furthermore, with stronger currents for anode opening and anode closing we find this reaction very frequently in middle-ear affections of any kind. I have, however, in diseases of the inner ear, noticed that hearing sensation occurred when the current was applied in cases in which the middle ear was entirely well. Besides, in patients suffering from tetany the acoustic nerve is frequently very easily excited, even if they have a perfectly normal hearing apparatus (Chovstek, jun., and myself). This short review shows how little practical results we can expect from this method of examination, however interesting it may be from a theoretical point of view."

In deciding what has caused the affection in our case, we must consider that we have before us a patient who suffered, previous to the attack, from some hardness of hearing.

This degree of deafness was, however, by far not so pronounced as after the attack spoken of. Low forks are heard in both ears. The negative Gellé in the left ear may speak for a stapes ankylosis, which may have existed before, but the hearing of the low forks and the rather diminished bone-conduction for the Blake fork do not favor this diagnosis. The most prominent points which aid in a diagnosis are :

1. The good general condition.
2. The just ended menstruation and the intimation of a new attack on November 24th and 25th during the latter period of menstruation.
3. The effect of the hot bath on a summer day.
4. The mechanical unfavorable position of the head.
5. The suddenness of the attack characterized by the appearance of (*a*) vertigo and nausea, (*b*) tinnitus, (*c*) diminished hearing.

All this would point to apoplectiform disturbance in the organ of hearing and in a portion of the complex organ of equilibration. The absence of all other symptoms would speak for a localization in the inner ear, and the rapidity of the attack would indicate a hemorrhage into the left inner ear. The patient says that she was just over the menses on that day, but that she took a hot bath and that she placed her head in a position very much favoring a disturbance of the blood circulation in the head. I am very much inclined to think that the menstruation stands in some relation to the attack. The appearance of vicarious menstruation would speak for a change in the vessels during the time of menstruation. For some reason or other, this probable cause, in connection with the mechanical external cause (hot bath, bending of head), very possibly led to a hemorrhage into the labyrinth.

Moos says in Schwartz's text-book, vol., i., p. 540 : " Hemorrhages from the ear with the character of vicarious menstruation occur whether the drum membrane is perforated or not. If it is not perforated, the hemorrhage emanates from the outer ear canal, perhaps also from the surface of the drum membrane (case of Eitelberg), or it occurs in the middle ear and becomes the cause of

a subsequent suppurative otitis media, as happened in four cases of Benni, or it occurs in the labyrinth and creates bilateral total deafness with or without vertigo (Jacobson, Koll)."

It may surprise us that a probable hemorrhage into the labyrinth does not cause permanent, violent disturbances. We might expect the nausea and vertigo, *e.g.*, to continue indefinitely. We must remember, however, that the inner ear is only a part of the complex organism of equilibration. Experiments on animals show that we must accuse more the reflex irritation from the inner ear for causing the symptoms than the destruction of it.

Panse, speaking of experiments on animals (*Zur vergleichenden Anatomie und Physiologie des Gleichgewichts und Gehörsorgans*, Jena, 1899, p. 195), says: "When the various canals were cut there was a complex disturbance of motion. If all those canals on one side were cut, or if the whole labyrinth (Ewald) was removed, the symptoms showed sometimes only for a short time."

Page 204: "The partial redress of symptoms in operated animals which were so violent in the beginning, and especially also the observations on human beings in whom the cochlea was expelled on both sides, which is scarcely conceivable without affection of the semicircular canals, and who did not show any vertigo, proves:

"First, that the semicircular canals are not a centre organ for the sensation of equilibrium.

"Second, that besides those, also other parts of the body inform us of our relation to space. These other organs are the eyes and the organs of touch, which can be excited by reflex from one organ of sense, namely, by the labyrinth. Under ordinary conditions both are only rarely excluded in human beings, yet Breuer mentions the strange sensations, which are described by deaf-mutes when they swim under the surface of the water. They are attacked by a terrific fear, and even in water only a few feet deep they swim directly under the surface without being able to appear above the surface by a simple motion of the head.

"As in about one-third of the deaf-mutes the labyrinth is missing, but as the central organ seems to be healthy, because it acts upon other irritations, we must consider the symptoms mentioned above as a defect of the organ of equilibrium in the inner ear."

Also the clinical observation in human beings corroborates this finding.

Panse (*loc. cit.*, pp. 197 and 198) says: "A valuable supplement of the experiment on the animal are therefore cases in which carious defects were found in the horizontal semicircular canal when the middle-ear cavities were opened. When the wound was packed, or if pressure was exercised with the probe on these parts, there appeared nystagmus-like motions of the eye and vertigo in such manner that the field of vision seems to move in a horizontal plane. These observations, which are made by many surgical otologists, or which can be made occasionally, prove, more clearly than any experiment on the animal, that we cannot speak of the irritation of the small brain.

"Jansen publishes from the Ear Clinic in Berlin a veritably confusing array of the most manifold cases of labyrinthine coaffection in middle-ear suppuration. The physiologically most important observations are those of thirteen surgical lesions of the semicircular canals, three times of the lower one. Even before the operation there were dizziness, nausea, and feeling of vomiting. In two cases there was, after the operation, violent nystagmus when the patient looked toward the healthy side. In nine injuries of the horizontal semicircular canal there was nearly always nystagmus. Since Jansen looked for it he has never missed it in injuries of the labyrinth except in one case in which only the bony canal splintered off, in which the membranous canal in all probability was not injured. In several patients with previous injuries the nystagmus could not be shown any more. The twitching seemed, as a rule, to be directed toward the healthy ear, and increased when the patient looked toward the same.

"These disturbances gradually disappear in the course of two to four weeks. As a rule, the vomiting ceases after four or five days; after eight days the patient is able to leave the bed without, however, being entirely free from dizziness. If the patient turns quickly, especially around the injured side, if he looks up, if he goes up or down stairs, the dizziness shows itself, still after a long period, sometimes lasting several minutes. Meanwhile the nystagmus decreases and disappears, as a rule, entirely after two weeks until, at the latest, after four or five weeks, whereas the disturbance of the equilibrium can be shown sometimes even

after years. In children symptoms seem to appear much less. Where the disturbances of the equilibrium are of a long duration, or where there is considerable decrease in hearing, the conclusion is justified that an infection of the vestibulum has resulted. Jansen mentions further: 'I have never seen in cerebral complications such grave forms of disturbances of the equilibrium as I have seen in these true rare cases of labyrinthian suppuration.'"

It would seem that the case described in this paper may be of interest for the reason that vicarious menstruation may possibly play an important part in the causation of the affection.

WHAT CASES OF CHRONIC PURULENT OTITIS REQUIRE THE RADICAL OPERATION?¹

BY ARNOLD KNAPP, M.D., NEW YORK.

THE radical operation for the cure of chronic purulent otitis has now been practised for about seventeen years. It may be assumed that a possible exaggeration of this operation's true worth, due to the enthusiasm with which every apparently meritorious procedure is received during the first years, has now been corrected, and that a sober judgment of the value of the operation can be rendered and its indications defined.

As far as I can judge, the views of this operation are tending to greater conservatism. Ballance² is the only one who states that he has no longer any doubt that all cases of chronic purulent discharge from the ear should be treated by the complete operation. Koerner³ says in his book that the radical operation is indicated as soon as the diagnosis of chronic osseous disease is confirmed; from a personal communication, however, while visiting his clinic two years ago, I found that he had returned with favor to ossiculotomy and subsequent treatment with the tympanic canula. Grunert⁴ states that the greater half of the cases where

¹ Read at annual meeting, Am. Laryng., Rhino., and Otol. Soc., Eastern Section, Syracuse, N. Y., February 10, 1906.

² BALLANCE: "The Difficulties and Dangers of the Mastoid Operation," etc. *The Lancet*, Sept. 30, 1905, p. 952.

³ KOERNER: *Die Eitrigen Erkrankungen des Schäfenbeins*. Wiesbaden, 1899.

⁴ GRUNERT and SCHWARTZE: *Grundriss d. Otologie*. Leipzig, 1905.

the excision of the ossicles was indicated were healed by this operation. Scheibe in Bezold's clinic no longer insists on a radical in every case of cholesteatoma, but treats his cases with the tympanic canula, and only operates if the fœtor does not disappear in three weeks. Jansen¹ is inclined to think that in these apparent cures the bone disease simply becomes latent for a time. To return to the subject of this paper :

I shall leave out of consideration cases of chronic purulent otitis where intracranial complications, stenosis of the canal, and acute mastoiditis are present, as the wisdom of operating under these conditions must be self-evident.

We have remaining a series of cases which are not of the same importance. Some of these are more apt to be followed by dangerous cerebral symptoms and should be operated upon under certain qualifying conditions. We shall first of all endeavor to trace the characteristics of these cases. An excellent and practical classification has been adopted by the Berlin Ear Clinic, as described by Heine,² where the cases are divided into two groups : dangerous and non-dangerous. In the former the bone is affected, especially in the attic and antrum. In the latter, the inflammation is more localized to the mucous membrane of the tympanum, a region from which intracranial complications rarely ensue.

In what way can we tell that the bone is involved? First, by the characteristics of the discharge and its fœtor. Second, by the otoscope picture. There is a total defect of the drum, or the perforation is marginal, the adjoining portion of the annulus eroded, the perforation being situated next to the superior or posterior wall—in other words, contiguous to the attic and antrum. The use of the probe, in my opinion, is of but little advantage.

It is important to determine the presence of cholesteatoma. This is sometimes difficult. In cholesteatoma the typical pearl-like epithelial scales are present in the canal, or can be

¹ JANSEN : *Die deutsche Klinik*, 1905, vol. viii., p. 245.

² HEINE : *Operationen am Ohr*. Berlin, 1904.

fished out with the hooked probe, or by the use of the tympanic canula, and have a characteristic odor. The presence of cholesteatoma is an urgent indication for operation unless the opening of the accessory cavities into the middle ear is large, and there apparently is no tendency to retention. I remember recently seeing a patient, with the history of an old otorrhœa, who was suffering intensely. Examination revealed an inflamed canal, a very tender mastoid, and the depth of the ear-canal filled with cholesteatoma. He was sent to the hospital for operation. Before operating I attempted to clean out his ear through the meatus, and removed enormous quantities of cholesteatoma from the mastoid process. This was facilitated by a large defect in the posterior wall. After it was all removed we had a large, clean cavity before us, like after a successful radical; the patient's symptoms were relieved, and an operation was not performed as it was no longer necessary.

In cases of simply chronic osseous involvement, the "caries and necrosis" of the authors, much can be obtained by conservative treatment. If under these conditions the discharge does not cease or lose its odor, the question of operation should be considered.

In addition to these local conditions, we have three general symptoms often present whose proper interpretation requires considerable experience. These are headache, nausea, and vertigo. The nausea is the least characteristic and usually associated with one or both of the others. The presence or aggravation of these symptoms, with a cessation of the discharge, points to the retention in the accessory cavities and usually necessitates operation.

Headache, of course, varies with the sensitiveness of the patient. The misleading symptoms of hysterical women have led to needless operations. The headache may be localized to the ear, or to that half of the head; it may be supra-orbital or occipital in location. We must try to bring this symptom in relation to the ear disease. It has seemed to me that pain over the eye on the same side as the ear affection is often connected with a process in the attic, while dis-

ease farther back in the antrum, especially in its posterior wall, causes more frequently occipital symptoms.

Vertigo is another symptom which must be gone into thoroughly. The ideas of the laity on what constitutes dizziness are very vague, yet if it be present in a typical manner, it is of greatest importance, indicative of labyrinth disturbance, and a very important operative indication. In one of my patients it was the only general symptom; at operation granulations were found extending through the oval window, which were successfully removed, and the symptom permanently relieved. In many cases vertigo means a lesion of the external semicircular canal, and with it there is always nystagmus, which can often only be elicited by directly examining for it. It must not be forgotten that in disease of the semicircular canal the hearing need not be lost.

This completes the "dangerous" group; the other cases, where there is but little likelihood of intracranial extension, are those in which the mucous inflammation in the tympanum predominates. These are the cases with anterior or central perforation and where the Eustachian tube is usually involved. I have been observing for years a young patient of this kind where the disease seems to be entirely in the anterior and tubal part of the tympanum. There are no symptoms beyond the discharge, which is muco-purulent, and without odor. The patient has been perfectly willing to undergo any operation, but we would accomplish absolutely nothing by converting the attic and antrum into an open cavity. It must be confessed that we are powerless in accomplishing much by operating for disease of the tympanic walls proper. Necrosis of the promontory wall had better be left alone. Curettage about the mouth of the Eustachian tube is often spoken of, but should be performed with great caution. The recesses in the tympanum are so hidden and surrounded by vital parts, not only for the patient, but for the operating surgeon (I refer to the facial nerve), that we frequently cannot remove all disease. I have a case in mind of a boy on whom I performed the radical operation three or four years ago, who, in addition to disease in the

upper cavities, presented considerable caries in the posterior segment of the tympanum. Every attempt to curette this region caused a facial convulsion, and the operation could not be completed. This same area is still unhealed. I do not think it can be too firmly emphasized that lesions in the tympanum without changes pointing to affections of the adjoining cavities do not call for the radical operation. The method cannot be radical in the true sense of the word, the patient is not relieved of the main symptom (the discharge), and the surgeon is discredited.

In the former or so-called "dangerous" group, there are many cases where minor operations suffice to bring about good drainage and to prevent retention and its dangers, but where there still remain indications of bone disease. The patients are safe when under occasional or constant observation. In these we must be led by the patient's wish. The operation is not urgent, but justifiable. We cannot blame a young girl for wishing to be relieved of a running ear. Other patients may wish to be released of the surgeon's apron-strings, and to regain their aural liberty. One point which is of the greatest importance is the state of the hearing in the other ear. If the other ear is poor we should do everything to avoid a radical in the affected ear, as we cannot guarantee, however careful we may be, but that the hearing will be diminished after the operation.

In conclusion allow me to express my views on the indications for the radical operation as follows:

The operation is not indicated when the tympanum and especially its mucous lining are involved, because intracranial complications are not likely to ensue and the operation usually accomplishes nothing.

The operation is urgent when the symptoms of headache, nausea, and vertigo are associated with, and in relation to, chronic purulent otitis; where the bone is found affected, or cholesteatoma is present, and these symptoms are not promptly relieved by a minor operation.

The operation is indicated when the signs of bone involvement continue after conservative treatment has been followed

for a certain length of time and the odor in the discharge persists. The operation is not necessarily urgent in these cases, as good drainage is present. The question of operation then depends on the patient's wishes and the condition of the hearing in the other ear.

THE LEUCOCYTE COUNT IN INFLAMMATORY DISEASES OF THE EAR AND OF THE TEMPORAL BONE AND IN OTITIC INTRACRANIAL COMPLICATIONS.

BY DR. SUCKSTORFF, HANOVER, GERMANY.

FORMERLY FIRST ASSISTANT IN THE EAR CLINIC IN ROSTOCK.

Abridged Translation from the *Zeitschr. f. Ohrenheilk.*, Vol. XLV., 1903,
German Edition of these ARCHIVES.

SINCE Curschmann in 1901 again drew attention to the importance of the leucocyte count in a diagnostic sense in suppurations, many papers have appeared which have more or less confirmed Curschmann's results. It seemed worth while to examine the number of leucocytes in the aural suppurations and to determine, if possible, whether the leucocyte count had increased when the purulent process had invaded the bone, or when a severe complication like meningitis, sinus thrombosis, or a brain abscess was present.

Head (*Pediatrics*, Feb., 1900) has counted the number of leucocytes in aural suppurations and states that in the so-called catarrhal otitis media there is rarely a leucocytosis, while in the purulent otitis media the leucocyte count is between 20,000 and 30,000 in a *ccm.* Fifteen case-histories of children are briefly reported, who suffered from various diseases, principally from appendicitis, with only one case of purulent otitis media. The leucocyte count in these cases gave 25,000.

My results are as follows:

I have examined seventeen cases of serous otitis media. I have included in this number the cases in which the paracentesis did not evacuate a distinct exudate and where principally

there was a decided flattening of the drum by hyperæmic swelling of the mucous membrane and a serous imbibition of the entire membrane. I also included in these cases cases where one was in doubt whether the evacuated exudate was serous or slightly clouded.

As Schwinge has shown, the number of leucocytes in children up to ten years of age is higher than in older children and in adults; my seventeen cases can be divided into two groups: those in patients under ten and those in patients over ten years old. In the first category there were six, in the latter eleven. The blood to be examined was obtained immediately before or after the paracentesis of the drum membrane. The leucocyte counts in children under ten years showed an average of 13,300. This, if we take 12,900 as the normal, shows that there is no increase in leucocytes in serous otitis media in children. The same relations were found in the serous otitis of adults. Repeated examinations after the aural inflammation had run its course showed that the leucocytes frequently diminished, though this diminution was always very slight.

Eight cases of acute purulent otitis were examined, four in patients under ten and four in patients over ten years of age.

The average in the former group was 20,150; in the second group, 12,900. There is, therefore, in acute purulent otitis a slight increase of leucocytes, which is, however, very slight, and does not possess practical importance. Head's figures are unquestionably too high. That the number of leucocytes in children under ten should be so large is not astonishing if we remember that children react with an increased number of leucocytes to suppurations and other diseases. After the otitis had run its course a decrease in the number of leucocytes took place, though this decrease occurred slowly. Fever, as has been shown by others, has apparently an influence on the number of leucocytes.

Six adult cases of chronic purulent otitis were examined. The average number was 10,700. Therefore we can see that there was no rise of leucocyte count in chronic otitis.

The cases of mastoiditis are of considerable interest for

us. These again must be divided into those with and those without intracranial complications. As a rule, the cases were principally those of acute mastoiditis; in a few, chronic mastoiditis with acute exacerbations. The mastoiditis without intracranial complications in children was present in four cases. The average number was 16,400. The mastoiditis in adults without intracranial complications showed an average number of 12,740.

We see that the count in mastoiditis without intracranial complications shows a slight increase in the leucocytes, more marked in children than in adults. The average number in adults in acute mastoiditis and acute otitis are exactly alike, while in children, if anything, the number of leucocytes in mastoiditis is less than in the uncomplicated acute otitis.

Two cases of meningitis were of considerable interest. Rieder believes that the absence of leucocytosis confirms the diagnosis of tuberculous disease of the meninges. A marked leucocytosis is more apt to speak for idiopathic disease of the meninges. He says that for the development of a leucocytosis in non-tuberculous diseases of the serous membranes the nature of the exudate (whether serous or purulent) is of less importance than the question whether the inflammatory process is about to develop or has become stationary. Turk found that in purulent cerebro-spinal meningitis and in secondary purulent meningitis leucocytosis was present. It would seem from these two authors that the leucocyte count might aid us in making the diagnosis of meningitis. Unfortunately these two cases of ours show that the leucocyte count does not give us a certain aid in the diagnosis of meningitis by an increased leucocyte count.

In conclusion it may be said that the leucocyte count does not aid us in determining upon a surgical intervention in the above-mentioned diseases. The reason why the leucocyte count is not increased in mastoiditis is possibly because the abscess in the mastoid process is surrounded on all sides by bone. The pus can therefore not act chemotactically as in the soft parts. The increase of leucocytes in the case of brain abscesses can thus be explained. Before the operation

the abscess was surrounded by a thick so-called abscess membrane from the surrounding tissues, and thus the body at large was protected from the action of the pus. If the membrane was then destroyed at operation the body reacted by an increase of leucocytes.

I am well aware that this material is insufficient to furnish definite data. It is published with the hope of inciting others with more suited material at their disposal to undertake further investigations, that we may thoroughly solve this interesting question.

ON POST-OPERATIVE PYOCYANEUS PERICHONDRI- TIS OF THE AURICLE.

BY DR. TATSUSABURO SARAI, JAPAN.

(FROM THE UNIVERSITY EAR CLINIC, ROSTOCK.)

Translated from *Zeitschr. f. Ohrenhkl.*, German Edition of these ARCHIVES,
Vol. XLV., 1903.

ONE of the most unpleasant complications in the after-treatment of ears which have been operated upon for chronic suppurations of the middle ear or the temporal bone after the Zaufal or the Stacke operation is the appearance of purulent perichondritis of the auricle. This obstinate, painful complication, which frequently leads to ugly thickening or deformity of the auricle, is the result of an infection of the cartilage with the bacillus pyocyaneus.

Pes and Gradenigo were the first authors to find the bacillus pyocyaneus in pus from perichondritis. Leutert found the pyocyaneus in pure culture in four cases of post-operative perichondritis.

It is of interest to see whether every post-operative perichondritis is caused by this bacillus.

Professor Körner has observed this complication five times in fifteen years. In all of these five cases the pyocyaneus had discolored the discharge from the wound green before the onset of perichondritis. This constant association of green pus with perichondritis suggested that the latter was caused by the bacillus pyocyaneus, and in the last case to be observed this etiological connection was confirmed.

It was the case of an anæmic girl of seventeen years of age who had been operated upon according to Zaufal, with Kör-

ner's meatoplasty. Three weeks after operation the presence of the bacillus pyocyaneus was suspected from the color and the odor of the pus. The wound cavity was no longer dressed with moist (2 % carbolic acid) gauze, but a dry dressing was applied every third day. Before introducing the dry packing, a pledget of gauze saturated in 2 % silver-nitrate solution was introduced into the ear for 10 minutes. This is a procedure which has been extremely serviceable in the Rostock Ear Clinic against the pyocyaneus in furuncles of the canal. A few days after the pyocyaneus had been observed, the auricle began to swell, with darting pains and slight rise of temperature. The auricle and the canal became red and tender. In a few days more the cavity and cyma conchæ were obliterated by the swelling, and the inflammation extended to the anterior part of the helix. As long as no fluctuation was present, the inflammation was treated with local dressings. After the wound cavity had been treated as has just been described, the auricle was carefully covered with gauze soaked in alcohol, and a piece of oiled silk and a bandage then applied. Under this dressing the pain disappeared and the inflammation did not extend.

After two weeks, fluctuation was found in the cavity of the concha. On pressure in the fluctuating area no pus escaped into the wound cavity. After packing the wound cavity the swollen area was disinfected and incised. The pus which escaped was thin, with flocculi, not green, and was received in two sterile tubes. The granulations were scraped and the cavity packed with gauze. The cartilage apparently was not necrotic and was left alone. The abscess cavity healed kindly, and instead of the gauze a drainage tube was inserted. Three weeks later some more granulations had to be removed. No cartilage was given off, and fourteen days later the incision had closed. A decided thickening of the cavity and cyma conchæ remained, which, however, diminished by the continuation of the local treatment.

The pus contained in the abscess was examined in the Pathologic Institute and the bacillus pyocyaneus was found present in pure culture.

A CONGENITAL FIBROLIPOMA OF THE PAL- ATAL TONSIL.

BY DR. ZOLKI IN STRASSBURG.

(Translated from, and with one illustration on Plate VII., *Zeitschr. f. Ohrenhkl.*, XLIV., German edition of these ARCHIVES.)

BENIGN tumors of the tonsils have rarely been observed. This is shown by the fact that Ardenne, in the year 1896, while writing his dissertation, inquired of the most prominent authorities in this branch in Europe and formally received the answer that this condition has never, or very rarely, been observed. I have consulted the literature on this subject in my dissertation on the *Benign Tumors of the Tonsil*, Leipzig, 1901.

The authors have apparently not considered this question of sufficient importance, whether the tonsil tumor was acquired or congenital, a very important point to my mind. On looking through the literature I find the following statements:

In demonstrating a fibroma of the tonsil before the New York Pathological Society, Delevan reported on a case of congenital fibroma of the tonsil which Wagner had observed. It was stated that the tumor, though of quite a respectable size, had not annoyed the patient until two weeks before the operation.

A similar case of congenital tumor with a tonsillar polyp was observed by Birkitt and Adami in a child four months of age.

We are fortunate in being able to add another case which was observed in the Strassburg University Ear Clinic.

M. S., seven years of age, has suffered for the last four years from a disturbance in swallowing. The mother states that shortly after the birth of the child she observed a tumor in the child's throat. On examination, a large pale-red tumor with a smooth surface is seen to be situated on the left tonsil, with a free end projecting into the buccal cavity.

The tumor is removed on the same day with Mathieu's tonsillotome. Fourteen days later the patient was healed. An inquiry made of the parents of the child four years later elicited the statement that no relapse had been observed.

The tumor is of an elongated club shape, attached with a narrow pedicle to the tonsil and sways freely in the mouth. At its broader extremity there is a small appendix. The smooth surface shows few indentations. The greatest length is 30mm, breadth 11mm, thickness about the same.

Microscopically, the covering of the tumor consists of several layers of pavement epithelium, which become horny in the superficial layers. The entire tumor consists of connective tissue traversed by numerous blood-vessels. The connective tissue is in general poor in nuclei. The few cells are usually fusiform in shape, frequently round and egg-shaped, with hematoxylin stain presenting distinct granulations which resemble mast-cells.

The fibrous tissue shows several areas of fatty and of lymphatic tissue. These are especially marked when the tumor is attached to the tonsil. This is, however, explained because a part of the tonsil was removed with the tumor. A number of lymph cells are also found in the fibrous tissue collected in groups of irregular shape resembling follicles.

The most unusual feature is an area of lymphatic tissue 5mm in diameter in the most external peripheric part, viz., the part farthest away from the tonsil. This part also contains follicles—in fact looks like a piece of tonsil.

In other words, this is a congenital tumor of the left tonsil in a child seven years of age. Macroscopically it presents the features of a benign tumor, which was confirmed by the microscopic examination and the subsequent clinical course. This showed that a tumor covered with pavement epithelium

consisted principally of fibrous tissue with islets of fatty tissue. As there were no collections of cells suggestive of sarcoma, and as the connective tissue predominated over the fatty tissue, the tumor must be regarded as a benign connective-tissue growth belonging to the group fibrolipoma.

Extremely interesting were the small areas of adenoid tissue. Their appearance can be explained by the theory that the fibrous parts in their growth had taken a small part of the tonsillar tissue with them, and the latter then developed into the lymphatic collections described.

ON THE COURSE OF THE SIGMOID SINUS IN THE CHILD'S SKULL.

BY DR. P. RUDLOFF, WIESBADEN.

Abridged Translation from *Zeitsch. f. Ohrenhkl.*, Vol. XLV., 1903, German
Edition of these ARCHIVES.

MACEWEN describes, in his well-known book on *Pyogenic Diseases of the Brain and Meninges*, peculiarities in the external surface of the skull which aid us in determining the course of the transverse sinus. As regards the course of the sigmoid sinus, he states that if we connect the deepest part of the parietal incisure of the temporal bone with the mastoid process, this line in the adult describes the middle part of the venous sinus, sometimes its posterior part on the left side, frequently its anterior margin. On examining a number of skulls, I have been able to confirm this statement for adults, but the conditions in the child are quite different. Macewen also states that in the new-born the sigmoid fossa is a very shallow groove, so that the sinus is very much more superficial than in the adult, but I have found that this does not sufficiently elucidate the conditions present in the child. Moreover, as this question has a particular value and, for the practising physician, it is frequently difficult to obtain material for these studies, I have examined a large number of specimens from the Anatomical Department in Marburg, and have come to the following conclusions.

I should like to preface this by a brief report of an unsuc-

cessful operation, which led me at the time to study more exactly these anatomic relations.

A child two years of age suffered from measles and from broncho-pneumonia and a left-sided purulent otitis. It is difficult to determine whether the high temperatures were the result of the middle-ear suppuration or not. Anybody who has met with this question knows that only a careful observation will give the correct solution. An observation lasting over five days showed that the symptoms on the part of the diseased lobe of the lung diminished, while the discharge from the ear remained the same and the temperature, which at first fell, then rose. The radical operation was therefore performed, and the bone, which borders on the middle and posterior cranial fossa, was carefully examined. There were no macroscopic lesions and no fistulæ. The temperature continued, and we had to think of a possible intracranial complication, in addition to the broncho-pneumonia, which still remained present. As there were no other symptoms characteristic of an intracranial complication (vomiting, somnolence, rigidity of the neck, retardation of the pulse), it did not seem advisable to operate further until, on the seventh day after the first operation, a metastasis occurred in the right shoulder-joint, by which the diagnosis of sinus thrombosis was made. The diseased joint was exposed, and at the same sitting the posterior cranial fossa was laid bare. An extradural abscess was evacuated. The pus focus had separated the dura from the bony surface to some extent, and a round opening with a diameter of almost 2cm resulted from the operation. The dura was grayish white. The discolored exposed dura did not permit us to determine the localization of the sinus. I neglected to expose more of the dura, thinking that the course of the sinus could be found from Macewen's line, forgetting that Macewen's statements do not apply to the juvenile skull, but to the skull of an adult. Thinking that the sigmoid sinus in a child had probably not advanced so far into the mastoid as in an adult, I made an incision on the lateral side of Macewen's line. I did not encounter a thrombus, nor

even fluid blood, but evacuated a few drops of serous fluid, which unquestionably came from the subdural space. The dressings were saturated for the next few days with cerebrospinal fluid and the child died two days later. The autopsy revealed that I had incised the subdural space at the inner side of the sigmoid sinus. The autopsy, moreover, showed that the incision of the dura was not the cause of meningitis, that this was a thrombus in the horizontal part of the transverse sinus extending into the superior petrosal sinus, and that, in addition to the metastasis in the shoulder joint, there were many metastases in the surrounding muscles of the chest, and that the head of the humerus, as well as the fifth and sixth ribs, were separated at the osseo-cartilaginous junction. Both lungs showed bronchopneumonia foci.

The anatomic conditions of the sigmoid sinus in the child are as follows:

In the child the anterior margin of the sigmoid sinus is situated at a varying distance posterior to Macewen's line:

I. At the level of the root of the zygomatic process the distance is:

1. In the new-born..... 6mm
2. In a child one year of age 6 "
3. In a child between two and three... 10 "
4. In a child six years of age..... 3 "
5. In a child between nine and ten... 7 "

II. At the level of the parieto-mastoidal suture the distance is still greater:

1. In the new-born..... 7mm
2. In a child one year of age..... 10 "
3. In a child between two and three... 17 "
4. In a child of six..... 6 "
5. In a child between nine and ten.... 16 "

The distance is greater the broader the mastoid process. In the new-born, the groove in the temporal bone over the sigmoid sinus is so shallow as to be hardly recognizable. It grows, however, in the course of years, and in the seventh

year it resembles a half cylindric groove, while the mastoid process, in its further development, extends somewhat backward. As the groove becomes deeper the sinus travels forward, so that its anterior margin in the course of years gradually approaches and passes beyond Macewen's line. These results were obtained from fourteen skulls. They show variations, but never the conditions which Macewen has described for adults.

My short paper should therefore serve to supplement Macewen's statements, and it is of great practical importance for the operator to know that the sigmoid sinus in the child is to be found in a different place from that of the adult.

REPORT OF THE TRANSACTIONS OF THE NEW YORK OTOLOGICAL SOCIETY.

By THOMAS J. HARRIS, M.D., SECRETARY.

MEETING OF JANUARY 23, 1906, DR. J. E. SHEPPARD, VICE-PRESIDENT, IN THE CHAIR.

Dr. ALDERTON presented a case for **diagnosis**.

Boy, aged eleven. Was first seen by him last spring. There was present, in addition to atrophic rhinitis and possible involvement of the right antrum, œdema of the uvula. This seemed to be due to the presence of a bristle in the supra-tonsillar fossa, which had evidently been there for some time. The bristle was removed, but the œdema continued. Later a portion of the uvula was removed and submitted for microscopic examination. The pathologist reported that it had many of the appearances of an endothelioma. There was some suggestion in the family history of syphilis, and iodide of potash was administered without effect. Later the case was seen, in consultation, by Dr. Berens, and upon his advice the iodide was increased to large doses and inunctions of mercury added, equally without benefit. Gradually the lips began to swell, and the condition of the patient has been growing worse. At the present time the uvula and epiglottis are enormously swollen and œdematous. The vocal cords cannot be seen. The soft palate is brawny and firm, and shows a peculiarly white color.

Discussion: Dr. HARRIS suggested the possibility of iodine poisoning, and referred to a case that he had recently seen with a similar appearance, where the iodides were supposed to have caused the condition.

Dr. QUINLAN agreed with Dr. Harris as to the possibility of iodism. He had seen such results in the larynx following the use of large doses of iodides. In his judgment children bore the drug poorly.

Dr. COWEN suggested the possibility of elephantiasis.

Dr. Bryant presented a case of **mastoiditis**, duration six weeks, with a history of recurrent middle-ear suppuration, in a boy seventeen years old; temperature 100.4° . An extensive section of the membrane was made. The mastoid process and cells were removed, and the posterior wall of the osseous auditory canal was taken down up to the annulus.

The superior wall of the meatus was removed, opening the epitympanic space, but leaving the attachment of the membrane and ossicles intact. The posterior and middle roots of the zygoma were removed. The dura mater was laid bare over the knee of the sinus and the tegmen tympani. The smear from the mastoid pus showed mixed infection. The wound was closed without packing.

First day, temperature normal. Second day, packing taken from the canal. Third day, patient up, no discharge from the ear. Nearly all the post-aural wound healed by first intention. Fifth day, fundus of canal nearly dry. Eighth day, patient goes out. Tenth day, membrana tympani healed and closed, fundus of meatus dry, post-aural wound healed, except one point. Eleventh day, all the wound scabbed over and healed. Sixteenth day, watch heard thirteen inches. One hundred and thirty-fifth day after the operation, watch heard forty-six inches in the operated ear, fifty inches in the normal ear.

There has been no pain or discomfort of any kind in or about the ear since the operation. Meatus looks normal, the membrana tympani nearly so. The post-aural surface is smooth, with a linear cicatrix. The mastoid process has been renewed, and is nearly the counterpart of its fellow.

Dr. ALDERTON presented a case of **pedunculated exostosis** of the upper osseous canal wall at its outer margin, which was discovered during treatment for impacted cerumen. He referred also to the development under observation of a recent case of exostosis of inner tympanic wall six months after an ossiculectomy.

Discussion: Dr. QUINLAN referred to a family of three

brothers in all of whom exostoses had existed, sessile in character. The men followed the river as a means of occupation and were in the habit of diving frequently. The growths were easily shelled out by means of a hook, previous skin incision having been made.

Dr. MCKERNON reported a case of **brain abscess** accidentally discovered in the course of a mastoid operation. The patient, a boy, was brought into the hospital in a comatose condition with a swelling over the right mastoid process. Operation the day of admission. Pus was discovered in the mastoid cells. The inner table was removed and the sinus exposed, also a portion of the cerebellum. In the course of the curetting, the curette accidentally slipped and wounded the exposed dura in the posterior portion of the temporo-sphenoidal lobe, and at once a quantity of pus, approximating one ounce, was evacuated. The finger introduced showed a distinct lining membrane. The cranial wound was dressed in the way recommended by Macewen—plain sterile gauze, wrapped up and saturated with equal parts of boric acid and iodoform. Healing took place in three weeks. No brain hernia occurred. The dura was not congested.

Discussion: Dr. ALDERTON commented on the absence of discoloration of the dura. He had recently seen a case where brain abscess was suspected. The dura was exposed and found normal, as was the adjacent bone. No puncture was made. Temporary improvement took place, but there was a return of the symptoms and death ensued. The autopsy showed abscess of the brain.

Dr. KENEFICK said we must bear in mind that normal brain tissue as well as normal bone may exist between the brain abscess cavity and the external wound.

Dr. ADAMS said that he always made punctures in the brain where he suspected an abscess. He reported a case where he had punctured the brain with negative results. The patient died, and although no autopsy was performed, in his opinion an abscess had been present but was not discovered owing to insufficient puncturing.

Dr. HASKIN reported a case of **extensive mastoiditis** where at the time of the operation a fistula into the brain was discovered. No packing was put in. The patient recovered.

Dr. BRYANT reported a similar condition discovered in the course of a radical operation.

Dr. McKERNON thought that the absence of all changes in the dura in the case of suspected brain abscess would incline him to refrain from puncturing.

Dr. BRANDEGEE reported a case of **death from pulmonary thrombosis following operation for sinus thrombosis**. This occurred in a child three years old who was admitted to the hospital for suppurative otitis and mastoiditis. An extensive mastoid operation was performed; uneventful recovery; and the patient was discharged from the hospital. Several months later the child was brought back for a secondary mastoid operation. Operation was performed on January 11th. Necrosis at the roof of the antrum was discovered, and a fibrous mass over the sinus was seen and partially removed. The sinus looked healthy. Two days later the temperature rose to 102° , and the third day to 106° . Mental condition good. Operation. On opening the sinus no return flow was obtained from below. The curette was introduced and readily established a return of the blood. The child did well after the operation. Four days later he suddenly awoke with a cry of pain and symptoms of heart failure. The chest appeared to be full of râles. Death. Diagnosis: pulmonary thrombosis.

Discussion: Dr. ADAMS felt that it was a good plan to remove the jugular vein, even in case of a return flow of the blood. The walls of the vein are liable to be diseased.

Dr. McKERNON thought that in future we would be inclined to do primary ligation more frequently.

Dr. KENEFICK felt that with the data at hand we were not yet prepared to draw firm and fast conclusions in the matter. He referred to a case of Dr. McKernon's where he saw a clot removed with a curette from the region of the jugular bulb and recovery took place without ligation of the vein.

Dr. HARRIS referred to Koerner's statistics showing that the percentage of recovery was about the same in the case of ligation of the jugular vein before and after opening the sinus.

Dr. McKERNON thought that Dr. Brandegee's case and the one operated by him, referred to by Dr. Kenefick, were not alike—the one was an acute and the other a chronic case. It had been

abundantly shown that the return flow of the blood, often in a large degree, proceeded from the petrosal sinuses.

Dr. DUEL thought the important question to be decided was whether we should invariably open the vein in cases of suspected sinus disease. His experience with sinuses covered with granulations, but with no sweats or "sawing" temperature, led him to adopt the plan of thoroughly exposing the sinus and then awaiting developments. Often the patient recovered without further symptoms. If, however, the sinus undoubtedly contained a septic clot, he thought the vein should be ligated before attempting its removal.

Dr. ALDERTON could see no objection to such a ligation of the vein.

Dr. RAE thought that no hard and fast rule could be followed. In cases where sufficient time for observation has not been permitted, and where the appearance of the sinus seems to demand interference, he did not think that the vein should be ligated until the sinus had been opened and the thrombus demonstrated. The sinus having been opened, hemorrhage from the torcular end re-established, and there being no bleeding from the bulb, he thought that the vein should then be ligated, without any attempt being made to establish hemorrhage with the curette. He also thought that if the rule were blindly followed of first excising the jugular, sooner or later the operator would necessarily face the situation of having removed the vein when subsequent opening of the sinus failed to reveal the presence of a clot.

In reply to Dr. Duel, he did not think that the presence of granulation on the sinus wall constituted an indication for opening the sinus. Such a layer might well be protective in character, and such a sinus should only be opened when the well-known indications of general sepsis were present.

Dr. ADAMS often opened the sinus when covered with granulations and with symptoms of sepsis, without finding any clot. These cases had recovered.

Dr. HASKIN agreed with Dr. Duel in the advisability of refraining from opening all sinuses covered with granulations even attended with other symptoms. He referred to his operative experience of seven years where, in a large number of mastoid cases, he had not found it necessary to open the sinus, and had had no fatal results.

Dr. COWEN reported a **fatal case of brain abscess**. The patient, a man, had previously been in a general hospital for a number of months, complaining chiefly of headache. On account of his complaints and peculiarities he was regarded by the physicians and nurses as a malingerer and was discharged from the hospital. Later he came under Dr. Cowen's care, who treated him for two and a half months. Hypodermics of morphine always relieved the pain, as did hypodermics of water which were soon substituted. There was a slight purulent discharge from the ear—one or two drops in the course of twenty-four hours. No mastoid tenderness. The consulting neurologist diagnosed a brain abscess, but was unable to localize it. After much reluctance, Dr. Cowen decided to operate upon the mastoid, which he found in a sclerosed condition. He was unable to establish communication with the tympanic cavity. No attempt was made to open the brain. The headaches showed some improvement after the operation. A short time later the patient suddenly died. Autopsy showed an abscess on the under and inner side of the cerebellum. Death was supposed to be due to the involvement of the respiratory centres. Dr. Cowen commented on the difficulty of deciding in such cases when to operate. The responsibility rests not with the neurologist but with the surgeon, and in his judgment the position of the abscess made him feel that it was fortunate he had not operated. There were no localizing symptoms whatever, and no temperature. Indeed he was not fully decided that the infection proceeded from the middle-ear.

Dr. BRYANT reported two cases of flat **exostoses** near the membrana where the canal was nearly closed. In reply to a question from Dr. Hepburn he said that there was a history of gout as well as syphilis.

Dr. HASKIN reported a case of **radical operation** where in the course of the operation the curette wounded the facial nerve, and it was found that the entire bony covering of the facial canal was lacking. It was possible to introduce the curette underneath the nerve. Considerable facial paralysis followed the operation, but a week later this had decidedly improved.

Dr. ALDERTON reported a similar case of exposure of the nerve where a paralysis had already existed for five weeks. This cleared up after the operation.

Dr. ADAMS reported a case of **obscure diagnosis with symptoms of sepsis** which was seen by him after having been under the care of Dr. Peabody for some time, who was unable to discover any organic disease. The ear showed evidences of some former disease. There was pain over the jugular and double choked disk. Operation on the mastoid was recommended. Very profuse bleeding followed the usual incision, as well as the opening of the bone. This was controlled with great difficulty. The sinus was finally exposed, but on account of the collapse of the patient this was not opened. In spite of saline infusion the patient died the same night. No clot was discovered later in the sinus, but an autopsy was not performed.

REPORT OF THE TRANSACTIONS OF THE SECTION ON OTOTOLOGY OF THE NEW YORK ACADEMY OF MEDICINE.

REGULAR MEETING, DECEMBER 14, 1905, DR. GRUENING IN THE CHAIR.

Presentation of Cases.

Exhibition of a case of deformity of both auricles in an infant restored by plastic operation. By ARTHUR B. DUEL, M.D.

This patient is of interest, presenting as she does a case of unusual sagging of both pinnæ from a deformity of the cartilages, corrected by removal of posterior skin-flaps. As you will see from the photographs taken before operation, the usual wrinkle formed by the anti-helix was absent in its upper half, leaving no dividing line between the cavum conchæ and scaphoid fossa. Grasping the skin on the posterior aspect of the ear at different points and carrying it back nearly to the hair line, it was found that a wrinkle was produced corresponding to the anti-helix and giving the appearance of a normal ear. These points were marked and the intervening elliptical piece of skin removed without cutting the cartilage. The skin edges were then brought together by interrupted sutures. Healing by first intention took place, resulting in perfect correction as you see it.

It has been recommended in the correction of such marked deformities that a piece of cartilage be removed. While the danger of a resulting perichondritis should not be too greatly magnified, it is, as we all know, possible that such an accident might occur, resulting in a deformity much more disfiguring than the

one we aim to correct. I therefore thought it might be interesting to show that such a marked deformity might be corrected without cutting the cartilage.

Dr. LEDERMAN mentioned a similar deformity which he had treated in an adult, and which had interfered materially with the patient's hearing. The deformity was caused by a large sebaceous cyst situated at the posterior surface of the auricle and by its weight caused the auricle to fall forwards, thus obstructing the external auditory canal. The growth was as large as a hen's egg. After removing it, a V-shaped piece of skin was removed over the mastoid at the upper border (base) and the auricle was stitched to this site. An excellent result followed. No cartilage was removed.

Exhibition and report of a case of thrombosis of the lateral sinus and internal jugular vein, with metastatic involvement of the knee-joint. Operation and recovery.

By JOHN R. PAGE, M.D.

This patient is thirty-eight years old, was treated for syphilis eighteen years ago, and had delirium tremens three times in the last three years.

On February 6th aural examination was made and history obtained of intermittent pain and tinnitus in his right ear for the past two months. Examination revealed a large polyp in the middle-ear, scant foul discharge, and no mastoid tenderness; no pain and no headache.

On February 8th he had a chill and a rise of temperature to 104° by mouth, and complained of intense pain on the right side of his head. On the following day I was sent for and advised immediate operation. Urinalysis showed presence of albumen and a few granular casts. Eye-grounds were normal.

Mastoid was opened under chloroform anæsthesia, and beneath a hard unperforated cortex pus was found. The inner plate was softened and a perisinuous abscess, with granulations on the sinus wall, extended from an inch behind the knee of the sinus downward over its vertical portion.

A complete "radical" operation was done, and the sinus, which was apparently distended and felt very hard, was incised.

The wall was almost 5mm thick and in the contracted lumen a soft dark-colored clot was found.

Scissors were then introduced and the vein laid open through-

out its whole exposure without encountering any flow of blood from either end. After a curette had been passed into the lumen of the vein for a half inch towards the torcular a considerable flow of blood was established. The same procedure was hurriedly followed below, but there was no bleeding.

The internal jugular was excised from the clavicle to the base of the skull. The vein was filled with fluid blood and its walls were apparently not thickened. After excision of the vein a curette was passed into the sinus down towards the bulb and finally a fair flow of blood was obtained from that direction.

On the day after the operation the patient complained of a troublesome cough and a slight pain in the right knee. Examination failed to reveal any other signs of inflammation.

On the third day he complained of pain in his left side and there, over a small area, friction sounds and diminished breathing were noted. Two days later his pulmonary symptoms subsided, and the pain began again in his right knee. The joint soon became swollen and tender and failed to respond to any conservative treatment.

February 22d (twelve days after operation) he had a chill followed by temperature of 104.4° . An incision was made on the outer aspect of the knee-joint and three or four ounces of sero-purulent fluid were removed. Great relief from pain was afforded, but on the following day he had another chill and temperature of 105.2° .

He was finally persuaded to enter the New York Hospital and remained there three weeks.

During the first week his temperature on one occasion rose to 103.8° ; aside from that it varied from 100° to 102° ; second week from 99° to 100° ; third week it gradually fell to normal, where it remained.

The following is copied from his hospital record :

"*Feb. 25th.*—Leucocytes 13,000. Differential: Polymorphonuclears, 79 %.

"Lateral incision was made on outer side of right knee. Thick discharge evacuated. Irrigated with salt solution. Rubber tube inserted. Wet bichloride dressing. Specimen from discharge sent to laboratory."

March 2d.—Laboratory report : "Diagnosis: purulent arthritis. Specimen consists of two small pieces of yellowish-gray soft

tissue. Sections show : partly synovial fringes densely infiltrated with small polynuclear cells, and partly free fibrino-purulent exudate.

"Blood culture.—Bouillon Flask I : Staphylococci. Agar plate : Staphylococcus aureus (pure). Bouillon Flask II : Sterile 48 hours."

Dr. Dixon of the New York Eye and Ear Infirmary reports the vein as follows :

"Numerous colonies which appear to be staphylococci are found in the wall, especially in the upper portion of the vein, and a few well-marked colonies of staphylococci are in the clot. It has been usual here to find them in the wall only and not in both. Specimen of fluid from the knee-joint showed on smear a large amount of pus with a few cocci present. On cultivation it was negative."

Discussion.

Dr. GRUENING inquired as to the manner in which the wound was treated, whether closed or left open, and Dr. PAGE replied that it was left open.

Dr. RICHARDS said that he had had the pleasure of seeing this case and that Dr. Page was to be congratulated on the good result which he had obtained. The points which had particularly impressed him were : the difficulty of making a definite diagnosis of thrombus after the sinus had been exposed ; that shortly after the attempt was made to dislodge the thrombus from the bulb prior to jugular resection there developed a metastasis of the knee-joint ; that the internal jugular vein at the time of operation appeared normal and gave no evidence of being involved in extensive partial thrombosis. Had the attempt at establishing a return flow from the bulb prior to jugular resection succeeded, a large portion of the thrombus would have been left in the jugular vein. The case illustrated the danger of trying to dislodge a thrombus from the vicinity of the bulb in order to obtain a return flow from below before the removal of the jugular vein.

A brief report of a case of acute mastoiditis presenting several interesting features. By ROBERT LEWIS, Jr., M.D.

The patient, a young man, aged twenty-three, in excellent physical condition, accustomed to out-door life and athletics, walked up Madison Avenue for over a mile in a severe snow-storm, on the 30th of January last.

The next morning he was awakened by a severe pain in the right ear. I was out of town when sent for and consequently did not see him until between 8 and 9 o'clock on the evening of the 31st. Hot irrigations had been used during the day, and the pain had practically disappeared by the time I saw him.

Inspection showed the helix, tragus, and lobe of the auricle to have been frost-bitten, the membrana tympani somewhat congested, not markedly so, however, and with no bulging. The temperature and pulse were but little above normal, and there was no mastoid tenderness present.

The patient had slept the greater part of the afternoon.

I ordered small doses of calomel, to be followed by a saline in the morning, and a continuation of the hot irrigations.

The next day there were a recurrence of the pain in the ear, an increase in the redness, and a slight bulging of the membrana tympani, and also some mastoid tenderness. I did a myringectomy under nitrous-oxide gas.

The smears obtained from the exudate were examined by Dr. Dixon, and he reported that they showed a rather active streptococcus infection. On the 2d and 3d of February there was a free flow of a sero-purulent fluid from the ear and the mastoid tenderness still persisted. The highest temperature was $99\frac{2}{3}^{\circ}$, and the highest pulse rate was 72. On the 4th of February I found there was considerable drooping of the upper posterior wall, and an increase in the mastoid tenderness. I performed the usual mastoid operation in the afternoon of that day. The mastoid cells were markedly involved.

At the time I congratulated myself upon the thoroughness with which I was able to clean out all the cells, and I felt that I had a most satisfactory wound to deal with.

Following the operation the wound made rapid progress towards healing. At what date the membrana tympani healed I do not know positively, but it was within three weeks after the mastoid operation.

By the second week in March the mastoid wound had closed with the exception of a narrow sinus leading down to the antrum; at the bottom of this sinus I could, with a probe, detect bare bone. I tried every method I knew of to get this to heal, but could make no impression on it. On April 21st the condition was about the same that it had been for a number of weeks past. On April

22d the external wound seemed to be losing tone ; on April 23d I saw him in the afternoon, and on removing the dressings I found that at least one-third of the new-formed tissue filling the excavated mastoid cavity had melted away. No thick pus was present, but a sero-sanguineous discharge. The membrana tympani was intact.

I was somewhat alarmed at the new infection and determined to operate the next day, which I did the following morning at the Infirmary. On removing all the new-formed tissue I found apparently healthy bone in every direction. On exploring with a probe through the antrum in the direction of the bare spot which I had previously felt for the past number of weeks, I found it led to the incus, which was denuded of periosteum and lying loose in the tympanic cavity. The head and neck of the malleus were also denuded of their periosteum, and the tympanic cavity was fairly well filled with granulation tissue.

The radical operation was performed, and the patient made a practically uneventful recovery, except that there is still present a small posterior perforation which will have to be closed by a plastic operation.

The question of interest is, Why did the membrana tympani heal up while in the tympanic cavity a diseased process was going on ?

The myringectomy was done on the second day of the disease and the mastoid operation on the fifth day. The denuded and dislocated incus, which I discovered at the second operation, was not in such a condition at the time of the first operation, nor was the tympanic cavity filled with granulations at that time. So notwithstanding the fact that the tympanic cavity was drained from both its upper and lower boundaries the diseased process still persisted, and yet the membrana tympani healed.

Never before having seen such a condition, I have taken the liberty of presenting the case for your consideration.

Dr. DENCH remarked that he had seen the same conditions present.

Infective sinus thrombosis. A Discussion of Certain Views Recently Advanced. By P.D. KERRISON, M. D. (Published in full in February number of these ARCHIVES.)

Discussion.

Dr. RICHARDS said that he had listened with interest to Dr. Kerrison's paper but there were several points to which he did not agree. He did not think that any one would open a sinus merely because it had granulations on it. The statement made in the paper referred to by Dr. Kerrison was that, when we are dealing with a suspicious sinus, *i. e.*, one which from the physical signs we have reason to believe thrombosed, it is best to open the sinus even though there are no symptoms; that to return these suspicious cases to bed to await the development of septic symptoms, *i. e.*, to await the disintegration of the thrombus and the passing of the disease from a local into a general condition, merely that a more definite diagnosis might be made, was an absolutely dangerous practice and one which would cause us to unnecessarily lose many of our cases. He had seen many cases lost through this practice. He did not agree with Dr. Kerrison that the time for elective operative interference in sinus thrombosis was when the disease was manifesting itself through symptoms of septic absorption. Referring to the remark made by Dr. Kerrison, that the method of exploring the superior petrosal sinus had not been stated, it may be said that in order to test the patency of the superior petrosal it is only necessary to remove the sigmoid groove to a point beyond the point of entrance of the superior petrosal into the sigmoid to block the flow from the torcular at this point, and also from the bulb end of the sinus below and from the emissary vein. The procedure is so simple if the anatomy is known that it seems unnecessary to state the method of performing it. Dr. Richards said that exception was taken to his regarding the inferior petrosal sinus as the continuation of the internal jugular vein. He was well aware that the inferior petrosal did not form with the internal jugular a perfectly straight line nor, as Dr. Kerrison had stated, an angle, but a curve. The question, however, was one of hydraulics; that from this standpoint the inferior petrosal was the one vessel which should be so regarded, as in direction it most closely approximated the jugular, and in addition there exists between the two vessels no anatomical arrangement which acts as a hindrance to the influence of aspiration upon the inferior petrosal, while between the sigmoid sinus and the internal jugular vein there is interposed an

hydraulic obstruction, a goose-neck mechanism which forbids our regarding the sigmoid in that light. Dr. Richards did not think that the position of the patient's head influenced to any extent the rapidity of the current in the inferior petrosal sinus, nor that gravity played any particular part in the blood flow of the intracranial sinus system. His reasons for regarding the inferior petrosal sinus as a governor or as an arrangement through which the flow in the intracranial venous sinuses could be influenced through aspiration had been stated in the paper.

Dr. KERRISON, in reply, said that Dr. Richards seemed in one or two points to have misunderstood his paper. He had not said, or intended to say, that Dr. Richards's directions as to the method of exploring the sinus were not clear. What he did say was that Dr. Richards advocated free opening of the sinus for the purpose of determining a suspected clot but gave no limit as to how this extensive exploratory operation should be terminated in case no clot could be found. Dr. Richards in his discussion had thrown out gravity as influencing current rapidity in the sinuses; this was a distinct change of view as in his (Dr. Richards's) paper the sharp declivity of the inferior petrosal sinus is mentioned as one of the forces determining a particularly rapid current in that vessel. Dr. Kerrison agreed with the view now expressed by Dr. Richards in his discussion, *i. e.*, that gravity is without influence upon current rapidity in various sinuses. Referring to Dr. Richards's statement that the rapidity of the current in the inferior petrosal sinus was altogether a question of hydraulics, Dr. Kerrison said that if hydraulic pressure varied in the different sinuses such differences could be explained solely by the distribution of the cerebral veins. The right lateral sinus, for instance, usually represented the direct continuation of the superior longitudinal sinus. The superior longitudinal sinus receives all the superior cerebral veins from the convex and mesial surfaces of both cerebral hemispheres; this blood could not flow forward toward the foramen cæcum, and must flow backward toward and through the right lateral sinus. The left lateral sinus, on the other hand, represented the continuation of the straight sinus which receives all the blood from the deep cerebral veins. The hydraulic pressure due to the influx of blood from the above sources must be very great and was augmented by the blood from some of the inferior cerebral veins and the superior petrosal sinuses which flowed directly

into lateral sinuses. The inferior petrosal sinuses received part of the blood from the cavernous sinuses; they were the only intracranial sinuses into which none of the cerebral veins had been traced. He could see absolutely no grounds for believing in a preponderance of hydraulic pressure in the inferior petrosal sinuses. In reply to Dr. Richards's question as to his operative experience in sinus thrombosis, Dr. Kerrison said that in the Manhattan Eye and Ear Hospital there had been in the past ten years 12,700 cases of suppurative otitis media and only 23 cases of sinus thrombosis, and that none of these had come under his care; and that in a fairly good operative experience he had not found it necessary to open the sinus, either for sinus thrombosis or as an exploratory measure. Dr. Kerrison in conclusion said that he had not meant to imply that Dr. Richards would open every sinus presenting a thickened dura covered with granulations. He did believe, however, that to advocate opening every suspected sinus, without giving any definite statement as to the symptoms or physical signs justifying such a suspicion, was dangerous advice which, if generally accepted, would be likely to result in the transferring of many patients to a land where sinus thrombosis does not exist.

The differential diagnosis between some of the serious sequelæ of purulent otitis media. BY FRANK ALLPORT, M. D., Chicago.

REGULAR MEETING, JANUARY 11, 1906, DR. GRUENING IN THE CHAIR.

Presentation of Cases.

Presentation of a case of traumatic mastoiditis. By SEYMOUR OPPENHEIMER, M.D.

C. F. O., aged forty-four years, was injured on May 11th by a dynamite explosion following a railroad accident at Harrisburg. He was thrown to the ground and stunned, but did not lose consciousness. Upon arising he noticed a sharp pain in the left ear and noticed a discharge of blood therefrom. No previous disease of the ear had been present. On the afternoon of the 13th examination showed a slight inflammatory œdema of the external auditory canal, a moderate amount of sero-sanguineous exudation being present at the lower part of the same. The drum mem-

brane was considerably congested with here and there ecchymotic spots. Two crescentic-shaped perforations were found, one situated anterior to the malleus and the other posterior, the marginal rings of the perforation showing dried blood-clots. Flaps of the membrane were detached, retracted, and slightly adherent to the inner wall of the tympanum. Hearing distance considerably diminished as per tests of watch, tuning-forks, conversation, and whisper voice. Slight elevation of temperature was present at times. A very faint degree of tenderness was experienced over the mastoid region, but this became steadily more pronounced when deep pressure was made. The discharge speedily became purulent and profuse, and neither diminished in quantity nor quality in spite of constant and careful attention to the ear. On the passing of a probe at subsequent periods through the perforation, roughened areas of bone were detected over the upper wall of the tympanum and involving the ossicular chain.

On July 24th, under general anæsthesia, the malleus and incus were removed and the tympanic cavity thoroughly curetted. In the region of the aditus ad antrum bare bone was distinctly felt, and this area was subjected to very forcible curettage, but it was considered at that time that in all probability the ossiculectomy would prove of no avail in checking the suppuration, as it was thought that mastoid involvement had already taken place. The patient experienced no ill effects from the operation other than the persistence of vertigo for some time, due, in all probability, to the forcible impaction of the stapes in the oval window. For the following ten weeks various forms of intra-tympanic treatment were employed for the cure of the suppuration, but without avail. During this period the patient suffered but little from aural pain, and no external evidence of mastoiditis could be ascertained other than dull pain upon deep pressure over the bone, which pain, however, could be elicited at all times. The temperature remained within the limits of normal.

On October 3d an opening was made in the mastoid process in the usual manner. The mastoid was of the markedly cellular and pneumatic type. The antrum and adjacent cells, particularly those of the tip, were found to contain large quantities of purulent material, rather offensive in odor, masses of granulation tissue, and large areas of necrotic bony tissue, exposing, on its removal, the dura over the sigmoid sinus and the middle cerebral region.

The posterior bony wall of the osseous meatus was extremely friable and necrotic, exposing on removal the facial nerve throughout a considerable distance of its course in its bony canal. Directly above the aditus ad antrum a distinct fissured fracture about $\frac{3}{4}$ of an inch in length was seen. The edges of the fracture showed it to be recent in origin. The cavities of the mastoid, aditus, and external auditory canal were thrown by this operative procedure into one large cavity. A flap of the Jansen-Stacke type was then cut from the membranous portion of the auditory canal, which flap was securely held in position by sutures, filling up, in a measure, the enormous bony cavity, the Eustachian opening of the cavity having been subjected to a thorough curettage in order to bring about complete closure of its walls. The posterior wound was then completely sutured and all dressings made from the enlarged auditory meatus.

At the present time, twelve weeks after the operation, epidermization of the cavity is progressing rapidly. The hearing remains greatly diminished.

The features of extreme interest in the case are the history of the development of mastoiditis following a distinct traumatism; the finding of a fissured fracture within the tympanic cavity; the futility of the conservative treatment, both medical and surgical, as applied to the intratympanic space in the attempt to avoid mastoid involvement; and the absence of all definite physical or local evidences other than the persistence of the suppuration, in the presence of an unusually extensive disease of the mastoid and its adnexa.

Discussion: Dr. EMIL MAYER said that the case presented by Dr. Oppenheimer had an interest from another point of view than that usually occurring. He referred to the medico-legal aspect.

In this case there were many reasons for the conclusion that the concussion, and that only, was the cause of his condition.

But if we might suppose a similar case in which we saw a patient two days after an alleged accident, the question might arise, How did we know that the patient was not at the time of the accident the subject of an acute inflammation?

This might be a hard question to answer, but in this case there was, in the speaker's mind, an answer.

The patient has a deviation of the nasal septum and a hyper-

trophy of the middle turbinate on the opposite side to the ear disease, and he would say that, in his opinion, all other things being equal, the ear affection would be most apt to be on the side which is stenosed.

In this particular instance, Dr. Mayer said that he had seen the patient before the ossiculectomy was done and had noted the torn membrana tympani, behind which the pus was welling out.

It was the proper thing to do to try the simpler operation, and that failing, the mastoid operation.

He thought that Dr. Oppenheimer deserved much credit for his successful treatment of this case.

Dr. GRUENING, referring to Dr. Mayer's suggestion that the otitis media was to be looked for on the side where there was a deviation of the septum, said that he thought this statement was too sweeping, and that he himself did not believe that the deviation of the septum had anything to do with the otitis. He did not think that the statement should go unchallenged, and thought that discussion on this point might be advisable.

Dr. MAYER asked if the Chairman wished to be understood as saying that the presence of anterior stenosis of the nose had nothing whatever to do with ear disease on the same side?

Dr. GRUENING said that he did not think the middle turbinate or septum had anything to do with the condition of the ear disease. He believed that the enlargement of the lower turbinal bone, especially the posterior end, had something to do with the encroachment upon the pharyngeal end of the Eustachian tube and might be followed by ear diseases.

Report of a case of mastoiditis and sinus thrombosis in an infant of twelve months. Operation. Recovery. By SEYMOUR OPPENHEIMER, M.D.

The recognition of sinus thrombosis in adults presents comparatively few difficulties when the condition is uncomplicated by other intracranial conditions, but in young children the reverse is usually the case, and when such a condition does complicate a mastoiditis it is difficult to recognize the vascular involvement, particularly during its earlier stages. The following case presents several points of importance, especially on account of the destruction present in the interior of the temporal bone with involvement of the sigmoid sinus; and yet at times during the

course of the disease the symptoms were so slight as to scarcely attract attention.

A. L., age twelve months, had a severe coryza when eight months old, accompanied by a marked degree of nasal stenosis, so that it was necessary before each nursing to cleanse the nasal chambers and reduce the congestion with adrenalin. At the end of a week the coryza disappeared and the child was in good condition when, after a restless night, the temperature rose to 102° . Examination revealed nothing abnormal except the left ear, which showed marked congestion of the membrana tympani and bulging of the lower segment. The membrana tympani was incised and a large amount of pus was released under pressure, and in a few hours the temperature returned to normal and the child seemed comfortable. At the end of ten days the discharge had entirely ceased, the incision in the tympanic membrane had healed, and in all respects the child appeared perfectly normal. Four months later the child was again brought for treatment with a history of having five weeks previously had a slight coryza followed by restlessness, pain in the left ear, and after a few hours slight purulent discharge. This continued until a week ago, when the discharge became scant. During this time he lost considerable weight, was fretful, slept irregularly, and would often refuse to nurse. Examination showed a scant, dark, offensive discharge in the canal, a large perforation of the inferior segment of the tympanic membrane; and pressure behind the auricle produced evidences of considerable pain. The temperature was normal. The condition of the ear and the asthenic state of the child indicated serious mastoid involvement and immediate operation was advised, but consent to this was not obtained. On the following day the temperature in the morning rose to 104.8° , pulse 130, respirations 32. Five hours later the temperature was 99° ; pulse 100, but weak; respirations 28, and the child looked very much worse, while the auricle was beginning to project and the mastoid region was becoming swollen. The conditions indicated that the lateral sinus had become involved, and the parents were informed that immediate operation was imperative. This was accordingly performed the same day under ether anæsthesia, the child being in a very serious condition, the temperature having risen just before operation to 104.3° . After incising the skin and opening the cortex the latter was found to be exceedingly thin over the antrum,

dark in color, and broke under very slight pressure from a spoon. The antrum was immediately under the surface of the bone and was full of granulation tissue and disorganized bone debris, while the mastoid, in great part, was necrosed and softened. This tissue with some pus was removed, the entire mastoid cortex was cut away, and as the aditus contained much granulation tissue the upper posterior canal wall was partly removed. After removing all of the cortex the carious osseous tissue over the sigmoid sinus was taken away, exposing the sinus at the bottom of the bony cavity. On palpating the sinus no pulsation was felt, so it was opened and a septic clot was found which was beginning to undergo disintegration. This was removed with the curette. Considerable difficulty was found in obtaining the blood-flow from above, but this was finally accomplished, and while the bleeding was controlled by pressure here, the clot lower down was removed and a free passage secured. The child was in a very bad condition, so hypodermoclysis was employed, and after rapidly removing all the necrosed bone that could be found, the wound was dressed in the usual manner. For two days following the operation the heart was weak and irregular, the pulse being between 130 and 160 and the temperature varying from 97.5° to 102° . Then the condition greatly improved until the fifth day, when the temperature suddenly rose to 104.5° . The mastoid was re-opened and a few drops of pus found in contact with the sinus. This was removed and fresh dressing applied, and the child rapidly progressed to recovery, the mastoid wound healing in seven weeks.

Of the various symptoms indicative of mastoid involvement, rigors, followed by a rapid rise in temperature to 104° or 105° , is one of the most characteristic; but in the very young child it is practically impossible to obtain any evidence of a definite chill, and considerable dependence must be placed, when the mastoid is involved, upon the frequent vacillations of the temperature over several degrees. The pulse rate is often fast, but later becomes slow and weak and usually offers little information. When the suppurative changes are extensive, the skin may show evidences of the general pyæmic condition, accompanied by disturbances of the alimentary canal. Vomiting, optic neuritis, and some retraction of the cervical muscles aid the diagnosis in adults, but in the infant the two former symptoms cannot be considered, while the latter is rather indicative of some meningeal involve-

ment. Should the thrombus involve adjacent venous channels, characteristic local symptoms are generally found, while should it extend down through the channel of the internal jugular vein, inflammatory band-like processes will develop along its course and the cervical region on the same side will be painful upon pressure. As these symptoms develop late, however, the most reliable diagnostic symptom (in the very young child) of sinus involvement during the course of the suppurative otitis media is undoubtedly the rapid, exaggerated oscillations in the temperature range, so that it is highly important that the temperature be taken at least every two or three hours, both by day and night, in order that such changes be not allowed to continue without recognition.

Discussion: Dr. LEDERMAN said that apropos of the difficulty of diagnosing otitis suppurativa in children, he had recently been called to see a child in a comatose condition, temperature 106° , with some indications of spinal meningitis, and the question was whether it was a case of cerebro-spinal meningitis or aural affection. On examination of the left ear the only clinical fact was the evidence of a slightly bulging superior quadrant, which was red. He advised immediate incision of the drum as a matter of exclusion. Toward evening of the next day there was a slight serous discharge from the ear referred to, the temperature returned to normal, and the child recovered without further trouble. Had not the incision of the drum been made, the child would probably have been treated for cerebro-spinal meningitis without recognizing the symptoms of the otitis. It was therefore a question of objective, not subjective, temperature in a child so young.

Dr. KENEFICK inquired whether the temperature was taken per rectum, and also asked Dr. Oppenheimer to explain a little more clearly how he used the gauze drainage.

Dr. OPPENHEIMER replied that the temperatures were all rectal. In regard to the drainage, he had simply introduced a gauze wick into the auditory canal to the membrane. It was not packed, but simply inserted to facilitate drainage.

Dr. EMERSON said that he would like to corroborate what had been said about the difficulty of making a diagnosis in a small child. He had recently seen a child ten months of age who had been under the care of two physicians for three weeks, and had been treated for gastro-enteritis. Finally they declared that they

did not know what was the matter with the child, and another physician was called in, who made a diagnosis by exclusion, finding no other cause for the temperature and condition, and then asked Dr. Emerson to examine the ear. This was done, but no bulging appeared, and the only reason for doing a paracentesis was the lack of lustre of the drum, which appeared different from the other side. Paracentesis was recommended to clear up the diagnosis, and the result was very gratifying. The child promptly recovered.

Dr. TOEPLITZ said that Dr. McKernon has reported five cases of children, four of whom recovered and one died. The diagnostic point he made was the rise of temperature in an ordinary otitis, which was not in accordance with the usual course in otitis media purulenta, and was the only symptom which led him to investigate the sinus. Dr. Toeplitz also referred to a case which he himself had recently treated in a child five months of age, where there was a rise of temperature after he had operated upon the carious mastoid. A radical mastoid operation had been done. The child had done well for a day or two and then there was a gradual rise of temperature up to 103° . On the fourth day the child was again operated upon and the sinus exposed. No pus was found. The child died after the operation, probably from meningitis. The point that he wished to make was that the ordinary rise of temperature, even to 103° or 104° , would not alone lead to a diagnosis of sinus thrombosis; the periods of intermission were important.

Dr. KENEFICK said that the reason why he had asked whether the temperature was rectal was that in cases of children, following mastoid operation the temperature frequently rises to 105° or 106° . The interval between such rises was very important, for they do not always oscillate between $105-106^{\circ}$ and $101-102^{\circ}$ within three or four hours. Sometimes these intervals are from day to day. The temperature may remain at 106° or drop at night to $101-100^{\circ}$, and go up the following day, and there would be no oscillations within two or three hours. On the other hand, such oscillations do occur, and this question was one of great importance, and calls for much deliberation, knowledge, and experience, combined with conservatism. He had seen the most alarming charts following operation for mastoiditis where pneumonia was suspected for days but did not develop, and where this was soon

followed by normal temperature. Had he been hasty, he would have investigated and found nothing. He felt that we should be sure of our ground and exercise great conservatism before investigating the sinus in infants and children.

Dr. ARNOLD KNAPP said that he had been very much interested in this report of the case, and would like to ask whether Dr. Oppenheimer had observed any abnormal position of the sinus in the child's temporal bone. Sinus thrombosis is unusual in a child so young; an abnormal position of the sinus might be a contributing factor in the sinus thrombosis. If he understood correctly, the Doctor said that he made the diagnosis on the simple physical sign that there was no pulsation. Nothing was said, however, about any change in the aspect of the sinus wall, but on opening the sinus a disintegrated clot was found.

Dr. OPPENHEIMER replied that if anything the sinus was somewhat posterior rather than anterior. The diagnosis of sinus thrombosis was made before operation, and no pulsation was felt over the sinus. The sinus was opened with the desire of excluding the presence of sinus thrombosis. He did not think one could always rely on the appearance of the sinus, except in those cases where there was an extreme thickening of the sinus wall or evidence of an ulcerative process involving the sinus. The diagnosis had been made previously by reason of the great variation of temperature within a limited period of time, and for that reason the sinus was exposed and opened.

Dr. KNAPP said that he did not doubt but that the diagnosis of sinus thrombosis had been made before operation, but simply thought it was remarkable to find a disintegrated clot with the surface of the sinus normal, because that does not exclude the presence of a lesion of the wall lower down near the bulb.

Dr. CHAMBERS said that Dr. Kenefick had spoken of being conservative. He then told of a case occurring just before Christmas where there was a mastoid without otitis media purulenta, and the condition was such that he thought it well to let it go along until he could be more satisfied that there was a cerebral abscess. The dura looked so healthy over the lobe and the sinus appeared so healthy that it seemed wise to wait for further symptoms. This was on Wednesday, and on Sunday, when symptoms were disappearing, the patient suddenly died. He did not think conservatism was always wise, and believed now that the

patient could have been saved if the apparently healthy brain had been explored.

Dr. RICHARDS said that it was not unusual to find the sinus normal in appearance, and on opening it find it occupied by a clot.

Dr. KENEFICK said he had spoken particularly of the condition in children.

Dr. GRUENING said that the oscillation in temperature is not always present. At times the temperature is high and remains high. He had seen a case in a child four years old where after operation the temperature reached 106° and remained there for six days. Many physicians were called in to make a diagnosis—pediatrists, aurists, and other specialists. They were all of the opinion that there was a clot in the sinus somewhere, and there was a high temperature of 106° without any oscillation. It was difficult to know on which side the clot was. Both sinuses had been exposed at the time of the mastoid operation. One sinus was completely covered with granulations, the other only partially. It was affirmed that the thrombus would be found in the latter, and it was found there. The patient recovered.

Report of a case of mastoiditis without any manifestation in the middle ear or external auditory canal. By JOSEPH A. KENEFICK, M.D.

This case occurred in Dr. Kenefick's service at the N. Y. Foundlings' Hospital. Richard A., two years old, on November 20th last was seen to have an area of slight redness back of his right ear, superficial in character and thought at first to be an eczema. There was no pain or tenderness on pressure, no discharge from the ear, and the child was apparently in perfect health at the time and was known to have been free from all disease for a period of three months previously. There were no indications of impaired hearing. On November 21st, the day following, the area of redness and swelling had extended some and there was slight tenderness on pressure. There was still no discharge from the ear, and no change in the appearance of canal or tympanic membrane. The temperature was normal and to all appearances the child was in perfect health and spirits. On the next day, November 22d, the swelling and redness had further increased, and a morning temperature of 101° F. had fallen to normal and remained there throughout the day. The auricle was now slightly displaced forward, with characteristic deformity; the

posterior auricular swelling now felt boggy to the touch; but the absence of continued fever, the slight tenderness, the normal canal and tympanic membrane, and the patient's general condition of unimpaired comfort and spirits were features so interesting and so unusual that it was concluded operation could be safely postponed for fifteen or twenty hours and developments in the middle ear awaited. The patient ate well and slept all night. The following day, November 23d, examination of the tympanic membrane and the canal walls showed them apparently perfectly normal, and there were no indications of deafness. The external swelling, however, had increased in size and gave distinct signs of fluctuation. It was decided to open it, and a large subperiosteal abscess containing about three drachms of yellow pus was found directly over the mastoid antrum and evacuated. Directly beneath the abscess the cortex was found necrotic over an area about the size of a dime. The bony tissues immediately beneath were softened down to the mastoid antrum, but no free pus was seen either in the antrum or the aditus. Indeed, so sound was the bone at this point that the spoon of a small curette was broken in enlarging the aditus. All the tissue appeared to be engorged with blood and bled freely, but no pus could be seen in the direction of the middle ear. The mastoid process was completely removed and the wound dressed as usual, the operation lasting thirty minutes. When the dressings were removed on the fourth day, the tympanic membrane had evidently ruptured and the packing in the canal was wet with yellow pus.

The case was interesting on account of several unusual features. Dr. Kenefick said that he had never before seen a post-auricular abscess not associated with a well-developed acute process or purulent process in the middle ear. In this case there was nothing of the kind to be seen. The mode of infection was also an interesting question. Primary abscesses in the post-auricular glands seldom occur in children. The method that suggested itself to him was that, the child being under two years of age, the infection had reached the middle ear through the respiratory tract, and the infective micro-organisms must have escaped from the middle ear by way of the vessels or the lymphatics and met particularly inflammable tissue in the post-auricular glands, and the process here had advanced more rapidly than the process in the middle ear. In these cases when one opens into such a subperiosteal abscess one is justified in opening into the mastoid

antrum, whether or not there is any indication of disease of the cortex.

Report of a case of radical operation for chronic otitis media suppurativa, followed by a secondary operation for removal of the internal ear, and later by an operation for the evacuation of a cervical abscess and an epidural abscess of the cerebellum. Death. By HARMON SMITH, M.D.

Italian, age fifty-eight, sent to me August 14, 1905, by Dr. Munger, of Waterbury, Conn., with the following history: Ear-ache had begun four weeks previously in the left ear, followed by discharge, which soon ceased. Pain continued and extended over greater surface of head. Dr. Munger performed a myringotomy and evacuated a quantity of dark, foul-smelling pus. Patient returned a week later with a partial facial paralysis and renewal of the symptoms, when a second myringotomy was performed. After three or four days of comparative comfort the symptoms reappeared with greater intensity. He was then sent to me for operation, and upon examination there were found the classical symptoms of mastoid involvement. In addition, the patient was dizzy, unsteady in gait, and unable to stand with eyes closed. Immediate radical operation was performed at the Manhattan Eye and Ear Hospital. Considerable necrosis existed in the middle ear and mastoid, and the facial canal was necrosed at intervals exposing the nerve. The progress was favorable, except the dizziness and optic neuritis, and the temperature and pulse reached normal seven days after operation. Three weeks after the operation he returned to Waterbury, when everything appeared to be progressing toward a favorable recovery. Here he was treated for one month, during the latter part of which granulations sprang up quickly in the lower portion of the wound, over which neither the curette nor silver nitrate could gain headway. In addition, the staggering gait was more marked, the facial paralysis remained complete, and there were hoarseness and difficulty in swallowing, which I concluded was a beginning glosso-pharyngeal paralysis. He was placed in the hospital, where silver nitrate and bichloride and alcohol were used in an attempt to overcome the granulations. The laryngoscope showed a complete paralysis of the abductor and adductor muscles of the larynx. There was also a paralysis of the left soft palate. A piece of granulation tissue submitted to Dr. Wright showed such an excessive amount of nucleus fragmentation that he concluded the case to be one of

syphilis. In addition to this, the neurologist pronounced the glosso-pharyngeal paralysis the result of a specific lesion of the dura of the bulb. Deep injections of bichloride of mercury were advised, together with saturated solution of potassium iodide. The paralytic symptoms improved under this treatment, but the ear conditions remained the same, and on November 10th a second operation was performed on the ear. Dead bone was found over the roof and floor of the tympanum, and the necrosis was followed into the labyrinth and continued until the semicircular canals and cochlea were removed. Unhealthy dura was also exposed down over the cerebellum for a considerable distance, but at no point was healthy dura reached. Believing, however, that I had gone sufficiently far for the dura to regain its normal condition, further removal of bone was discontinued. The sinus was not disturbed. The patient's condition markedly improved after this operation, and a few days following his gait improved, the dizziness disappeared, and the glosso-pharyngeal symptoms markedly cleared up. His condition continued good until December 6th, nearly a month after the second operation, when there was a suspicious rise of temperature. These septic symptoms abated until December 15th, when they again appeared, and continued until December 22d, when I performed a third operation. The patient at this time was dull and incoherent, temperature 104° . I followed the unhealthy dura of the cerebellum downwards and evacuated a small cervical abscess, but not believing this to be the occasion of such septic condition I continued to the foramen magnum and evacuated an epidural abscess at the base of the brain, containing about an ounce of creamy pus without odor. Believing I had at last reached the end of my difficulties, I dressed the wound and returned the patient to bed. His temperature dropped, by 4 A. M., to 98° axilla, pulse 96. His mental symptoms cleared somewhat, so that he knew his son and myself, and talked fairly rationally.

His temperature remained below 100° for 12 hours, when it started on an upward journey until it reached 104° on December 28th, six days after operation, when he died.

Permission was given to examine only the brain, which showed the following conditions. Dura tense and injected, and over the wound thickened, rough, and dry. The antero-inferior portion of the left tentorium was a quarter of an inch thick and contained an evacuated abscess cavity, the inner walls of which

showed two perforating erosions. The lower bony wound was the seat of extensive necrosis, reaching half way around the foramen magnum, and probably of specific nature. Ventricles contained six ounces of purulent fluid. The Sylvian fissure showed purulent exudate extending as far upward as the fissure of Rolando. The base of the brain showed extensive purulent exudate with thickening of the lepto-meninges, especially that covering the bulb and crura. The optic chiasm was covered with markedly thickened pia arachnoid, upon which a fresh purulent exudate could be seen. Microscopically there were few evidences of bacteria—only a few isolated diplococci. In many places, especially along the ventral fissure of the medulla, the pia arachnoid was enormously thickened and showed a previous condition upon which a fresh purulent infiltration had been engrafted.

Report of a case of double mastoiditis with sinus thrombosis on the left side, presenting several interesting features. By EMIL GRUENING, M.D.

The patient, a young boy, was brought into Mt. Sinai Hospital with a discharge which had existed for three years. For a few days prior to admission he had suffered from headache, vomiting, high temperature, and chills. His temperature rose to 105° and then dropped to 101° . In this condition he was brought to the hospital in an ambulance. Examination showed that he had a double mastoiditis, and he was operated upon. It was found that he had a softening of the bony covering of both sigmoid sinuses. The sinuses were exposed and the child was returned to bed. The temperature would rise as high as 105° , fall to 100° , and then rise quickly again to 105° . The boy was carried a second time to the operating table and both sinuses inspected, but nothing abnormal was found, only a little white speck on one sinus. Both sinuses seemed soft, still it was thought there might be a sinus thrombosis. The bone seemed to be healthy everywhere. His eyes were examined and both optic disks were found injected, but there were no definite indications for operation found. The next day the child again had a temperature of 105° and an optic neuritis was found on one side. It was well that he had been examined before. The sinus on the right side showed some change—some patches which looked white, while on the left side it looked normal. The sinus was opened on the evidence of the optic neuritis, and was found to contain an infected clot. The

jugular was tied, and the facial also, before the clot was removed. When an attempt was made to remove the upper clot, the anæsthetist said that he could not count the child's pulse, and that the operation would have to be interrupted. The sinus had not been completely exposed and clot could not be removed with the forceps, so a piece of iodoform gauze was pushed into the sinus and when this was withdrawn the clot came out with it, followed by a large gush of blood. The patient made a good recovery and was discharged from the hospital on the second of January. The interesting points of this case were the bilateral mastoiditis and the exposure of both sigmoid sinuses; the diagnosis of thrombosis of the left sinus made by the ophthalmoscope. Another feature was the removal of the clot by pushing iodoform gauze into the lateral sinus and then withdrawing it, followed by the clot.

Discussion.

Dr. LEDERMAN told of a case which occurred some years ago where the ophthalmoscope aided materially in hastening the proper treatment. The patient was a man with an acute otitis media suppurativa, who gave a history of being a laborer employed in ditching. The suppuration yielded under the proper treatment and the drum resumed a normal aspect. The patient was kept under observation because of a continued temperature which resembled the malarial type. There was a temperature of $103-104^{\circ}$ every other day, with chill, fever, and sweat. Plasmodia were found in the blood, but otherwise the examination was negative, and the temperature persisted. Hypodermics of quinine were given, but produced little effect on the temperature. There were no local symptoms of involvement of the mastoid or head, except some soreness on deep pressure over the region of the mastoid antrum, but this symptom was not constant. For a number of days the temperature persisted, running from 101° to 102° , and the oculist said he noted a beginning neuritis, though this was not definite enough to warrant surgical interference. Then the patient said he thought he felt more sensation over the antrum, but this symptom was not distinct. On the third day following the appearance of the eye symptoms, the oculist felt certain of the neuritis and exploratory operation was advised. While no disease of the cortex or cells was found, on reaching the antrum a few granulations were removed. Still no satisfactory cause for the trouble had been discovered and the wound

was about to be closed when probing revealed a soft spot on the floor of the antrum, and an epidural abscess was found, the size of a hickory nut. The patient recovered.

Some considerations on the circulatory disturbances, the result of ligation of the internal jugular vein in a case of sinus thrombosis. By W. P. EAGLETON, M. D. Published in full in this number of these ARCHIVES.

Discussion.

Dr. RICHARDS said that he had in a large number of cases of sinus thrombosis examined the eyes immediately before and after the removal of the jugular vein but had not in a single instance been able to observe any congestion of the retinal veins following this procedure. Some years ago he had operated on a case in which a completely obstructing thrombus extended from the torcular Herophili to the junction of the internal jugular and facial veins. Several days after the excision of the jugular (the lower portion was partly filled), papillitis was observed in the eye of the corresponding side. Papillitis had, however, existed in the opposite eye prior to operation, and it was doubtful if the second papillitis was due to the resection of the jugular vein. He had also observed a case in which, after the resection of a jugular containing a generous volume of blood, there developed a sudden violent but transitory mania.

REPORT ON THE PROGRESS IN OTOTOLOGY DURING THE SECOND QUARTER OF THE YEAR 1905.

BY PROF. ARTHUR HARTMANN, BERLIN.

Translated by Dr. ARNOLD KNAPP.

ANATOMY AND PHYSIOLOGY.

97. MOST. **Anatomical and clinical investigations on the lymphatics of the external and middle ear.** *A. f. O.*, vol. lxiv., pp. 189 and 233.

98. CITELLI. **On the structure of the human Eustachian tube.** *Archivio italiano di otologia*, etc., vol. xvi., Book 5.

99. GRASHEY. **An atlas of typical X-ray pictures of the normal man.** *Lehmann's med. Atlanten*, vol. v., München, 1905.

100. PASSOW. **On the functions of the labyrinth.** *Berl. klin. Wochenschr.*, 1905, Nos. 1 and 2.

101. NOLL. **A case of labyrinth necrosis.** *Dissert.*, Berlin, 1905.

97. The lymphatics of the external and middle ear were carefully examined by the injection method of Gerotas. By this method the distribution of the lymphatics was demonstrated over the auricle, the auditory canal, and the Eustachian tube, but not over the tympanum or the drum membrane. For these the investigations had to be carried on according to Kessel's method of impregnation. According to this there is a continuous capillary network which passes from the auricle and the external auditory canal through the drum membrane into the tympanum and the tube to finally reach the pharynx. The regionary glands of the external ear can be divided into four groups: 1. The pre-auricular glands, which receive the lymph from the neighborhood of the tragus as well as the anterior and superior periphery of the auditory canal. 2. The infra-auricular glands, which receive their supply from the lobules, the greater lower

part of the auricle, and the lower wall of the canal. 3. The retro-auricular glands, which receive the lymph from the greater part of the auricle. 4. The deep cervical glands along the internal jugular vein which receive the lymph from the posterior and partly from the lower auditory canal walls. This group of glands represents the second stage of the lymph supply of the external ear because the vessels from the groups 1 to 3 empty into group 4. The regionary groups of the Eustachian tube are the retropharyngeal glands and the deep cervical glands at the side of the common jugular vein. To demonstrate the regionary glands of the tympanic mucous membrane of the drum membrane, the author relies upon clinical examination, because anatomical investigations did not succeed. According to this, the lymph of the tympanic mucous membrane and of the drum has two passages: (1) into the lymph region of the external ear; (2) into the lymph region of the Eustachian tube. The latter path is of especial importance in the case of children in the first years.

HAENEL.

98. This paper gives a detailed description of the histological structure of the human Eustachian tube, and is accompanied by three plates.

RIMINI.

99. This atlas consists, in addition to a general treatise on X-rays, of 97 autotypes of X-ray photographs of the human body, which are so perfect as to furnish an excellent object to compare pathological conditions with. The first 13 pictures are especially of great interest to the aurist, because they represent very clear pictures of the head and face in all diameters.

BRUEHL.

100. Six cases of one-sided labyrinth necrosis and one case of bilateral disease of the labyrinth were obtained out of the material of the Charité Clinic. Examinations for disturbances of equilibrium gave the following results, which do not agree in many respects with the well-known results of Wanner.

At the onset of the labyrinth disease most patients suffered from vertigo and disturbance of equilibrium. In only one case was there an absence of vertigo throughout the entire disease.

After recovery, which took place after a more or less extensive destruction or sequestration of the labyrinth, the following conditions were found: Subjective vertigo on rotation was absent

in four cases especially examined. On walking and standing with closed and open eyes, no swaying. On rotation in the various patients there was disturbance of equilibrium to a varying degree. Examination for nystagmus after active rotation also gave inconstant results. In two cases, like those of Wanner nystagmus occurred on rotation toward the healthy side in the physiologic manner, while it was absent on rotation towards the side without a labyrinth. In bilateral loss of labyrinth there was no nystagmus. The other three cases showed no irregular conditions.

On moderate rotation the nystagmus occurred in one-sided cases in the physiological sense, also on rotation towards the diseased side. The case with bilateral defect of the labyrinth remained free from nystagmus. An uncertainty and weakness of the muscles of the body on the affected side could not be demonstrated.

MUELLER.

101. Complete report of a case in which the right vestibule and the semicircular canal were removed in Passow's clinic. The patient showed no vertigo either at rest or during rotation about a vertical axis. Nystagmus on looking to the left during rest increased on rotation to the right, nystagmus on looking to the right principally in a physiological sense, *i. e.*, after active rotation to the left. No reduction of the muscular tone of the extremities of the affected side.

HARTMANN.

GENERAL.

a.—REPORTS.

102. FERRERI. **Report of the Ear and Nose Clinic of the University of Rome**, ii., 1904. G. D'Antonis.

102. This report for the year 1904 shows the activity with which the assistants and voluntary physicians work in this clinic under the excellent leadership of Ferreri.

The report consists of fourteen important papers treating various subjects of this specialty. The report contains 341 pages and can be recommended as extremely readable.

RIMINI.

b.—GENERAL PATHOLOGY AND SYMPTOMATOLOGY.

103. HAIKE. **Tuberculous ear disease in nurslings.** *Deutsche med. Wochenschr.*, No. 24, 1905.

104. GERBER. On diseases of the walls in suppurations within bony cavities. *Deutsche med. Wochenschr.*, No. 14, 1905.

105. RUGANI. Disturbances of hearing caused by fever. *Archivio ital. di otologia*, etc., vol. xvi., book 3.

103. Five cases of tuberculous ear disease were examined, which showed the first symptoms from the fifth week up to the seventh month, which resulted after several weeks or months in the death of the patient. In two cases the possibility could not be excluded that the sputum containing the bacilli could have passed through the Eustachian tube into the ear and thus have led to the ear lesion. In the other cases, however, it was clear that the tuberculosis of the ear was a primary process. The port of entry was the mouth and the pharynx, though in distinction from adults a tuberculous primary lesion could not be recognized. Moreover the author states that the Eustachian tube may itself be the seat of disease in nurslings, while in adults it generally serves simply for the passage of the tuberculous sputum without itself becoming infected. To the question of the origin of tuberculous ear disease owing to the rarity of primary peritoneal tuberculosis, the milk containing bacilli does not enter into the question, but the infection takes place by direct contagion from a tuberculous mother or nurse by kisses, cleansing of the mouth, etc., and the disease of the tube, being a post-embryonic path of infection, speaks against the possibility of inheritance from the mother.

NOLTENIUS.

104. This paper is based upon cases of complicated diseases of the ear and of the nose: sinus thrombosis, brain abscess, and a case of diffuse meningitis and rhinogenic brain abscess and orbital complications. GERBER states that though the brain complications originating in the mastoid process are very much more frequent than those which correspond, namely, resulting from an involvement of the walls of the frontal sinus, the relative benignity of the frontal-sinus operations is very much lessened if the orbital and then in a second line the central walls are diseased and the extension of the suppuration to the surrounding walls finds no resistance.

NOLTENIUS.

105. This interesting paper gives the results of an examination of the ear in 50 cases of febrile conditions. The deductions are important and not suited for a short review.

RIMINI.

C.—METHODS OF EXAMINATION AND TREATMENT.

106. NEUMAYER. **A protecting apparatus for the physician during the examination of the upper air passage.** *Münch. med. Wochenschr.*, 1905, No. 15.

107. HINSBERG. **Examination of the ear.**

KÜMMEL. **Examination of the nose, and examination of the mouth and pharynx.** Reprints from *Lehrbuch d. klinischen Untersuchungsmethoden*, Verlag von Urban & Schwarzenberg, Berlin und Wien, etc., 1904.

108. PASSOW. **Balneology and ear disease.** *Berl. klin. Wochenschr.*, 1905, No. 16.

109. FREY. **The influence of the sea climate and sea baths on diseases of the ear.** *Wiener med. Presse*, 1904, No. 50.

110. MENDEL. **Fibrolysin, a new product of thiosinamin.** *Therapeutische Monatshefte*, Feb., 1903.

111. HIRSCHLAND. **On the use of thiosinamin in otology and rhinology.** *A. f. O.*, vol. lxiv., p. 107.

112. OPPENHEIM. **On black bandages.** *Deutsche med. Wochenschrift*, No. 12, 1905.

113. GOLDSCHMIDT. **To explain the absence of hearing and sight.** *Deutsche med. Wochenschr.*, 1905, No. 12.

114. BRYANT. **The value of the present quantitative tests for hearing, with demonstration of a new apparatus.** *Medical Record*, April 1st, 1905.

106. On the back surface of the reflector there is a thick plate of glass 15 x 12 cm, which covers with the reflector the face of the examining physician. It can be easily removed.

SCHEIBE.

107. These reprints contain a complete description of the methods of examination of the regions in question.

HARTMANN.

108. This is a paper read before the Balneological Congress, in which a brief review is given of the cases in which climate and springs heterotherapy are important factors in the treatment.

MUELLER.

109. In this paper, read before the Society of Balneologists in Abbazia, the author opposes the idea of the danger of sea baths in ear diseases. He believes that a residence near the sea, especially near the Adriatic, is indicated for protracted acute pharyngitis, in congested conditions of the mucous membrane after acute otitis, in scrofulous children who have been operated upon in whom the tendency to heal is slight.

BRUEHL.

110. Thiosinamin is soluble with difficulty. On giving internally, without action, subcutaneous injection causes pain to most patients. The author has therefore produced a double salt and chemical combination of this sinamin and salicylate of soda, and calls this combination fibrolysin, which is supposed not to have the unpleasant features of thiosinamin. As the agent is susceptible to light and air, it is put on the market in little brown ampullæ, each one of which contains a sufficient quantity for one injection. The contents of each ampulla is 0.2 thiosinamin; the ampulla contains 2.3ccm of fluid.

1. Fibrolysin seems to have the same action as thiosinamin, with the following advantages:

2 It can be used subcutaneously, intramuscularly as well as intravenously, without causing the patient any inconvenience.

3. It is readily soluble and consequently is more rapidly absorbed.

4. The production of fibrolysin solution in ampullæ furnishes the cheapest method of using the medicine and at the same time gives an absolute guarantee of its sterility.

HARTMANN.

111. The author has obtained good results with the use of thiosinamin and fibrolysin in several cases of chronic deafness, caused by disturbances of the sound-conducting apparatus. In some the hearing was improved, in others tinnitus was relieved. Only those cases were tried in which other methods of treatment had failed.

In addition to the thiosinamin treatment (intramuscular or subcutaneous injections are the best), the mechanical treatment must be followed. Only straight cases of middle-ear disease are suited, and these only where there is no new formation of bone. The author has also observed good results in stenosis of the auditory canal, adhesions, and scars in the pharynx in *ozæna*.

HAENEL.

112. The well-known dealer in bandage material, Paul Hartmann, Heidenheim, has succeeded in manufacturing a black gauze bandage in which the color does not fade.

NOLTENIUS.

113. GOLDSCHMIDT attempted to educate a patient fifty-six years of age who suffered from tabes, and had been blind and deaf for ten years, by means of a writing speech in which a mem-

ber of the family would make letters and words on a table with the index finger of the patient. A form of stenography seemed most suited in which the vowels were represented by points, while the consonants were partly written out in full or the characteristic part was made use of. It is remarkable that the plastic writing of the blind, consisting of six points, could not be acquired by the patient.

NOLTENIUS.

114. BRYANT uses the phonograph to reproduce the same sound with the same intensity and pitch. A sound-proof box prevents the escape of sound. A device enables the operator to turn the sound on and off from either ear without the knowledge of the patient. Bryant claims that the amount of sound reaching the patient can be accurately gauged, and at the same time be under the control of the expert. The machine supplies a standard voice test and serves for the comparison of test. The machine could be made uniform. It accurately determines the limit of hearing. It detects feigned deafness, by combining changes in the graduating valve with those in the malingerer's valve. It detects slight loss of hearing as well as hyperacusis. It measures the psychological factor in audition. It measures fatigue of the hearing mechanism. It is an acoustic masseur. Bryant prefers monosyllables to longer words for the phonographic test.

M. TOEPLITZ.

d.—DEAFMUTISM.

115. PANSE. **Four temporal bones of two deaf-mutes.** *A. f. O.*, vol. lxiv., p. 118.

116. BEYER. **The ears of albinotic animals.** *A. f. O.*, vol. lxiv., p. 273.

115. PANSE gives the following results of his examinations :

CASE 1. Left : Normal external and middle ear except for a bone necrosis of the posterior branch of the stapes with the oval window. A loosening of the cartilage combining the stapes with the vestibule. Cochlea: Reissner's membrane depressed and adherent to the pars basilaris. The stria vascularis is but little changed. There are several fissures in the ligamentum spirale. Corti's membrane deformed, the usual normal sulcus spiralis is displaced and attached by a layer of cells, the papilla basilaris is degenerated, not a single column is preserved. There are a few cells in the spiral ganglion. The auditory nerve is degenerated. Endarteritis obliterans of the cochlear artery in the auditory nerve.

Right : There is exudate between the neck of the hammer and the drum membrane, bony necrosis of the posterior branch of the stapes, dilated blood-vessels in the oval window and the promontory. The anterior and external ampullæ are distorted. The epithelium shows colloid degeneration. The nerves are atrophied. Endarteritis of the vestibular artery. Colloid degeneration of the macula utriculi, and dilatation of the saccule and degeneration of the epithelium. The saccule and the cochlea distended. Reissner's membrane prolonged. Ligamentum spirale very vascular. Membrane of Corti deformed. Corti's organ perceived in the form of a shallow elevation of atypic cells. The external and internal sulci spirales are normal. In the spiral canal there are only a few ganglion cells.

CASE 2. Right : Middle ear and superior portions normal. Reissner's membrane interrupted, absent in the middle and upper part of the cochlea. Membrane of Corti partly absent and partly deformed. Corti's organ preserved in the middle and in the upper part as an elevation consisting of a colloid mass and atypic cells. The stria vascularis very poor in blood-vessels. The ganglion cells are wanting and the nerve fibres are disintegrated.

Left : Middle ear and superior part normal. Reissner's membrane is partly absent and partly adherent. Corti's membrane is deformed but preserved. Corti's organ consists of an indistinct collection of cells. The stria vascularis shows colloid degeneration without vessels. The spiral ganglion cells are few as are also the auditory nerve fibres.

HAENEL.

116. This is the result of the examination of the temporal bones of two albinotic cats which were practically deaf, and an albinotic deaf dog, which were prepared and preserved directly after death from chloroform. The sound-conducting apparatus and the labyrinth capsule seemed perfectly normal. The upper part of the labyrinth practically intact, the lower part was changed in its form, and its delicate nerve terminals. The epithelium of the maculæ sacculi could hardly be recognized. The otolith membrane was partly disintegrated. The sinus utricularis and ductus reuniens are present as thin fissures. Reissner's membrane is depressed, causing the lumen of the ductus cochlearis to be much narrowed. The stria vascularis absent. The membrana tectoria wedged into the spiral sulcus.

The papilla spiralis consists of a collection of cells. The changes are most marked in the basal pharynx. In the dog every trace of Corti's, Hensen's, hair, and Deiter's cells is absent. That these changes are true degenerative changes, and not an error in the treatment of the specimens is shown by the condition of the spiral ganglion, which was found very atrophic. The conditions coincide with the changes found by Alexander in albino animals.

HAENEL.

EXTERNAL EAR.

117. LEIDLER. On acquired atresia of the external auditory canal. *A. f. O.*, vol. lxiv., p. 254.

118. LAVAL. On regionary anæsthesia of the external auditory canal. *A. f. O.*, vol. lxiv., p. 142.

117. This is a report on 9 cases of acquired atresia which were operated upon in Politzer's clinic. In 6 there was complete occlusion of the auditory canal, in 2 marked stenosis. The occlusions in 4 were bony, of which one consisted in spongy and 3 in sclerosed bone. The treatment in 7 of the cases was that for the associated chronic purulent otitis, viz., radical operation with Koerner's meatoplasty.

HAENEL.

118. Independently of von Eicken, regionary anæsthesia has been practised in the Halle Clinic by action on the nerves which supply the auditory canal according to the method which Oberst first suggested in the case of the fingers and toes. It is possible to act upon all of the three nerves: the external auditory branch of the auriculo-temporal nerve, the auricular branch of the vagus, and the branch of the great auricular nerve. Generally in operations on the auditory canal anæsthesia is obtained by influencing the first two nerves. The technique is carefully described, during which injuries to neighboring structures should be avoided. The injection fluid used is the tablet containing cocaine and suprarenine of Braun, which is dissolved in $\frac{1}{2}$ ccm of water. The action begins after 5 minutes, and continues for 15 to 20 minutes. Signs of intoxication were never observed. In operations on the auditory canal complete loss of pain can be obtained; in the case of the drum membrane, however, the sensibility is only reduced, as the sensory fibres of the tympanic plexus are not influenced. In extraction of the ossicles the method was not a success. The method has been followed in about 15 cases.

HAENEL.

MIDDLE EAR.

a.—ACUTE OTITIS MEDIA.

119. ESCHWEILER. The diagnosis and treatment of the acute inflammations of the middle ear. *Mediz. Klinik*, No. 3, 1905.

120. KONIETZKO and ISEMER. A case of secondary acute otitis media following an empyema of the antrum of Highmore. *A. f. O.*, vol. lxiv., p. 592.

121. GERONZI. A case of paralysis of the abducens nerve of otitic origin. *Archivio italiano di otologia*, vol. xvi., book 2.

122. FERRERI. On the lymph vessels which serve as paths of infection for certain otitic complications. *Archivio italiano di otologia*, etc., vol. xvi., book 2.

123. DE LINS. Hernia of the tympanum. *Annales des maladies de l'oreille*, März, etc., 1905.

124. LOMBARD. On the pathology of mastoiditis. *Annales des mal. de l'oreille*, März, 1905.

125. SCHÜTZ. The shortening of the after-treatment of acute mastoid operation by the use of paraffin. *München. med. Woch.*, 1905, No. 26.

119. This paper is intended for general practitioners. The treatment of acute middle-ear catarrh calls for Politzer's experiment repeated five or six times and insufflations of aristol into the naso-pharynx. In acute otitis media the uninterrupted use of an ice-bag is recommended, no insufflations, the application of heat is contra-indicated. The analgesic instillations are not mentioned. The excellent effect of carbolic-acid glycerine is not recognized. In increasing pain and bulging of the drum, paracentesis is recommended. HARTMANN.

120. A woman suffering from chronic empyema of the antrum of Highmore died from sepsis. The autopsy revealed a recent suppuration in the ear of the same side, and a connection between the two foci seems to have been given. The infection probably progressed as follows: through the carious posterior wall of the antrum of Highmore into the pterygo-palatine fossa, then through the vidian canal into the venous plexus of the internal carotid, thence to the neighborhood of the Eustachian tube and along the tensor tympani muscle into the tympanum.

HAENEL.

121. Twenty days after the onset of an acute otitis media, the patient, forty years of age, suffered from headache and a paralysis of the abducens nerve on the same side, which disappeared completely after one week. The author believes that abducens paralysis occurs reflexly from the labyrinth, a supposition which

had already been expressed by Moos and Urbantschitsch, and does not agree with Gradenigo's view that a circumscribed, meningitis is the cause. RIMINI.

122. The author draws attention to a feature which has not received enough attention, that in acute otitis media an inflammation of the soft palate of the mastoid process can result from the extension of purulent germs in the lymph vessels from the tympanum. Two cases are reported in which the mastoid operation was performed but where the mastoid process was found intact. RIMINI.

123. In acute otitis media the author observed polypoid tumors appearing at the site of perforation in the drum, which he regards as something new. This is certainly the circumscribed hypertrophy of the tympanic mucous membrane which was described by Bezold in 1894, a condition which is better termed a prolapse than a hernia of the tympanic mucous membrane. BOENNINGHAUS.

124. In pneumatic mastoid processes there is occasionally a bony wall between the antrum and the terminal cells. If this wall be removed aberrant cells appear which extend beyond the sigmoid sulcus and beneath the semicircular canal. In purulent mastoiditis, empyema of these cells, if they are not opened by operation, may lead to serious complications. BOENNINGHAUS.

125. Three cases with good results.

If in acute purulent otitis the granulations can be followed from the antrum into the tympanum, SCHÜTZ considers it advisable to perform the radical operation. The writer wishes to distinctly oppose this suggestion, because granulations in the aditus and in the tympanum can spontaneously disappear. SCHEIBE.

b.—CHRONIC PURULENT OTITIS.

126. CHAUVEAU. **The influence of vaccination on suppurations of the tympanum and on eczema of the auricle.** *Arch. internat. d'otol.*, etc., vol. xix., p. 521.

127. NEUMANN. **The technique and indications for extraction of the hammer and anvil.** *A. f. O.*, vol. lxiv., p. 167.

128. BEYER. **Simulation of a sinus prolapse from isolated caries of the terminal mastoid cells.** *A. f. O.*, vol. lxiv., p. 289.

129. ROSSI MARCELLI. **A tuberculous polyp of the middle ear.** *Archivio italiano di otologia*, etc., vol. xvi., book 5.

130. KLUG. **Suppurations of the labyrinth.** *Annales des maladies de l'oreille*, etc., Feb., 1905.

126. Following vaccination, an otorrhœa which had existed for three years in a patient sixteen years of age ceased without local treatment. The eczema of the auricle was also healed.

OPPIKOFEK.

127. The hammer and anvil are extracted in the Vienna ear clinic during local anæsthesia after Neumann's method, which is as follows: Injection of a 1 % cocaine solution with the addition of tonogen under the periosteum of the upper bony canal wall. This procedure suffices to render the drum, tympanum, attic, and antrum insensitive to pain, and anæmic. The operation is performed on the patient sitting upright. To extract the anvil, a small curette bent at an angle of 100° is employed. If the attic extends unusually high up and in the case of a septic suppuration of a cholesteatoma of the attic, as much of the lateral attic wall is chiselled away under local anæsthesia until there is no retention of discharge and the space is accessible to further treatment. The extraction of these two ossicles is performed in all cases of chronic otorrhœa in which the suppuration is localized in the upper tympanic segment, in the attic, or in the antrum, and when no symptoms of an extensive disease of the temporal bone are present, and when conservative treatment followed for weeks and months has remained without avail.

HAENEL.

128. Three years after radical operation, with exposure of the healthy sinus and with normal convalescence, a bluish prominence appeared as large as a bean in the region of the sinus, which was taken for a sinus prolapse because it increased in size on exerting pressure on the jugular region. At operation the sinus wall was everywhere found covered with bone. In the lowest part of the terminal mastoid cells there was a carious focus consisting of granulations whose increase in size on pressure on the jugular vein must be due to the simultaneous pressure of the posterior auricular veins.

HAENEL.

129. A young patient suffering from hip disease in very poor general health presented a polypoid tumor in the left auditory canal. This was removed and upon examination consisted of two parts, a granulating portion under the microscope like tuberculous tissue, and a second part resembling the true neoplasm of connective tissue. Attention is drawn to the rarity of the condition.

RIMINI.

130. This is principally a description of personal cases. Four cases of labyrinth necrosis after scarlet fever which show that the entire labyrinth does not always become necrotic and that the facial nerve is not always affected. The fifth case is interesting; chronic otitis media. Ménière's symptom complex: vertigo, vomiting, and deafness. Then meningeal symptoms. Operation: revealing cholesteatoma. Autopsy: purulent inflammation of the labyrinth with an empyema of the endolymphatic sac as large as a bean. The pus had broken into the labyrinth through the annular ligament. Meningitis.

BOENNINGHAUS.

C.—CEREBRAL COMPLICATIONS.

131. FREY. **Diagnosis and operation of otitic brain abscess.** *Wiener Presse*, 1905, No. 23.

132. SCHMIEGELOW. **On the pathology of otitic brain abscess.** *Arch. internat. d'otol.*, etc., vol. xviii., p. 337.

133. BURGER. **On otitic brain abscess healed by operation.** *Nederl. Tijdschr. v. Geneesk.*, 1904, ii., p. 1480.

134. VILLARD and LECLERC. **An otitic abscess of the temporal lobe.** *Lyon médical*, 1905, p. 373.

135. TÖRNE. **A remarkable case of acute perforative otitis media.** *Hygeia*, 1905, p. 375.

136. HÖLSCHER. **Otitic diseases of the meninges. II. The diseases in the subdural space and the purulent inflammation of the pia.** *Breslens Sammlung*, viii., 4/6.

137. DALLMANN. **A case of pneumococcus otitis.** *A. f. O.*, vol. lxiv., p. 147.

138. ALEXANDER. **A case of otitic infectious thrombophlebitis.** *A. f. O.*, vol. lxiv., p. 89.

139. GRUNERT. **On the dangers of the operation on the jugular bulb; the formation of an encephalocele.** *A. f. O.*, vol. lxiv., p. 97.

140. TRONCONI. **On thrombophlebitis of the lateral sinus of otitic origin.** *Archivio italiano di otologia*, etc., vol. xvi., book 5.

131. This paper was read before a society of general physicians and gives the methods by which otitic abscesses of the brain are treated in the Vienna ear clinic.

BRUEHL.

132. SCHMIEGELOW has observed 19 cases of otitic brain abscess, 10 in males, 9 in females; 4 in children, and 15 in adults. In 13 cases the preceding suppuration was chronic and in 6 it was acute. The abscess in 13 cases was situated in the temporal lobe, in 6 in the cerebellum. Recovery in 30%, death in

70 %. The diagnosis and treatment are given and the 19 case-histories are reported, of which 9 have previously appeared.

OPPIKOFER.

133. A girl four years of age was taken ill with a right-sided acute otitis media following an ordinary coryza. The drum perforated spontaneously 6 days after the onset of the ear pain. Three days later there was an epileptic attack with vomiting, the convulsions principally in the left half of the face and the left extremity. These disappeared after a few hours; a transient paresis of the left arm remained. There is nothing else of particular interest. The good health of the child after the attack was undisturbed. There was no tenderness behind the ear, but there was some sagging of the superior canal wall. Mastoid operation: the mastoid process is infiltrated with granulations. The middle cranial fossa is exposed. There is no extradural abscess. The dura is normal and pulsates. The wound is packed with gauze. At first there were no cerebral symptoms but a moderate rise of temperature and a rather slow pulse (88-96). On the 3d day another epileptic attack with vomiting occurred. Second operation: evacuation of a very large abscess filled with fœtid pus in the right temporal lobe. The healing progressed uninterruptedly with drainage.

Of special interest in this case are the occurrence of a brain abscess after an ordinary acute otitis media after coryza; the protracted spontaneous perforation of the drum membrane and the neglected paracentesis; the muco-purulent nature of the tympanic discharge which was without odor, and the intense fœtor of the brain abscess; the rapid development of a large brain abscess with practically no symptoms. Except for the two attacks of convulsions there was no headache, no disturbance of the sensorium, no distinct symptoms of brain pressure, no local brain symptoms, no disturbances of the general condition.

Finally 12 cases of otitic brain abscess are reported which appeared in the literature of the Netherlands, a case of extradural suppuration, abscesses of the temporal lobe and of the cerebellum, a large abscess in the frontal lobe which was first detected at autopsy, 3 cerebral abscesses, 7 abscesses of the temporal lobe. Of the last 10 abscesses, 6 were healed by operation.

BURGER.

134. A left-sided otorrhœa which had occasioned no symptoms for 26 years then suddenly led to somnolence, retarded pulse,

fever, vomiting, and chills. No symptoms characteristic for an abscess of the temporal lobe. At operation, the mastoid process and the posterior cranial cavity, were found normal. On exposing the middle cranial cavity, an abscess of the temporal lobe containing 150g of fetid pus was discovered. Drainage for 6 weeks. Recovery. OPPIKOFER.

135. The patient had suffered previously from a left-sided purulent otitis. He had contracted syphilis 15 years ago. At present there is pain in the left ear. The drum is retracted and red, showing a scar inferiorly. Two days later spontaneous supuration and a perforation in the region of the scar. This was followed by symptoms of retention and the formation of a circumscribed and elastic protrusion in the anterior and upper quadrant of the drum membrane which had to be repeatedly perforated, upon which a few drops of pus escaped. One month after the onset of this attack there was an epileptic seizure, later light amnesic aphasia, ptosis, and tenderness of the mastoid process. Operation on the mastoid process was followed by no improvement, and he died 22 days later. At autopsy an abscess as large as a hen's egg was found in the left temporal lobe; the anterior part of the drum cavity closed off by adhesions, with perforation of the tegmen. JÜRGEN MÖLLER.

136. After an anatomic introduction the author describes lumbar puncture, internal pachymeningitis, subdural abscess, and purulent leptomeningitis. With the aid of personal observations a complete picture of these diseases is given, including the etiology, diagnosis, and treatment. BRÜHL.

137. Bilateral acute purulent otitis, which was followed 7 weeks later by meningitis with an apoplectiform onset, terminating fatally in 24 hours without having previously produced any symptoms on the part of the bone or in the skull. Autopsy revealed extensive bony disintegration in both mastoid processes. Upon perforation of the bone in the sigmoid sulcus and at the superior petrosal sulcus, extradural abscess, extensive leptomeningitis. Pneumococcus was found in pure culture both in the pus of the antrum and in the exudate in the meninges. HAENEL.

138. The patient presented himself three months after the onset of his ear trouble. He had suffered from pain in the ears and head and some deafness. One month after the onset of the suppuration, was operated upon for mastoiditis and subperiost-

teal abscess. At this operation, extensive disease of the dura in the middle and posterior cranial cavities, with a foetid purulent sinus thrombosis, was discovered. This seemed, according to the history, to have caused no fever, no chills, and no metastases. Bacteriological examination revealed Gram-positive diplococci, many with typical capsules. A diplococcus grew in colonies, which was characterized by an unusual mucoid characteristic of the growths in agar, and in other biologic and cultural points resembles the diplococcus of pneumonia. HAENEL.

139. In this case of thrombosis of the jugular bulb, the operation on the bulb was followed by meningeal symptoms due to a disturbance in the circulation. Four weeks after the operation there was a sudden escape of cerebro-spinal fluid from a brain fistula which persisted for six weeks. This curious condition is explained as follows. The disturbance of circulation caused by the operation on the jugular vein and bulb caused areas of softening in the brain; the toxic substances originating in these areas produced a secondary hydrocephalus. This in turn caused necrosis of the cerebellar dura, prolapse of the cerebellum, ventricular fistula, and escape of cerebro-spinal fluid. The case recovered with the persistence of an encephalocele which required a constant pressure bandage. HAENEL.

140. This is a report of a typical case. The operative treatment of lateral sinus thrombosis and especially ligation of the jugular vein are fully discussed. RIMINI.

NERVOUS APPARATUS.

141. RUGANI. **A case of paralysis of the left facial and auditory nerves.** *Bollettino delle malattie dell' orecchio*, etc., April, 1905, vol. xxiii.

142. POLLAK. **Nervous deafness in pulmonary tuberculosis.** *Beiträge zur Klinik der Tuberkulose*.

143. CLARKE. **On certain symptoms in cerebellar tumors.** *The Bristol Med.-Chirurg. Journal*, June, 1905.

141. The patient, two-and-a-half months after a syphilitic infection, was suddenly taken ill with deafness, tinnitus, severe headache, and vertigo. There appeared immediately paralysis of the left facial nerve. With antisyphilitic treatment the disturbances on the part of the ear gradually disappeared and the facial paralysis was completely recovered from. RIMINI.

142. A girl, twenty years of age, who had suffered from childhood from purulent otitis after scarlet fever, became totally deaf

in a few days after hemoptysis without any suggestive noises or symptoms of vertigo. The presumptive diagnosis was bilateral auditory neuritis following tuberculosis. HARTMANN.

143. Two interesting cases are reported in which complete deafness and very distressing tinnitus preceded for a long time the pathognomonic symptoms of a cerebellar tumor.

In two other cases Ménière's attacks were the first symptoms. In most cases optic neuritis is an early sign which can be of aid in the differential diagnosis. CHEATLE.

NOSE AND NASO-PHARYNX.

a.—GENERAL PATHOLOGY.

144. STEVANI. **On disturbances of the stomach and heart of nasal origin.** *Bollettino delle malattie dell'orecchio*, etc., vol. xxiii., No. 7.

144. A patient thirty-two years of age suffered from obstinate dyspepsia, dyspnœa, and severe palpitations of the heart. After the disturbance of nasal respiration caused by a chronic rhinitis had been relieved by proper treatment the gastric and cardiac symptoms were rapidly cured. RIMINI.

b.—OZÆNA.

145. MELZI. **On the treatment of ozæna.** *Arch. internat. d'otol.*, etc., vol. xix., p. 822.

145. Melzi injected paraffin (melting point 50°) with good success in twenty-three patients suffering with ozæna.

OPPIKOFER.

c.—TUMORS.

146. RUTH. **A case of bleeding septal tumor.** *Arch. f. Laryng.*, xvi., No. 3, 1904.

147. IWANOFF. **A case of primary carcinoma of the frontal sinus.** *Arch. f. Laryng.*, xvi., No. 3, 1904.

148. CALAMIDA. **Carcinoma of the sphenoidal sinus.** *Arch. internat. d'otol.*, etc, vol. xix., 385.

146. The tumor presented the histological appearance of an angiosarcoma. ALBANUS.

147. This rare case was a patient seventy-five years of age who observed a swelling at the left inner angle of the orbit after an attack of rhinitis. After examination pus was found under the middle turbinal. The entire extremity was removed and severe hemorrhage occurred. The swelling at the angle of the orbit

disappeared, but returned shortly after and was more pronounced, with pain in the orbit and displacement of the eyeball externally. On inspecting the nose in the region of the upper meatus there was a collection of pus, and in place of the middle turbinal a bleeding fleshy mass was found. A swelling as large as a nut occupied the inner angle of the orbit. The eyeball was displaced out and down.

At operation the frontal sinus was found filled with a pale red glutinous tumor which on removal exposed the dura mater and there was a large opening into the nose. There was a prompt recurrence. Death 8 months after the operation, $1\frac{1}{2}$ years after the first symptoms. No metastases. Microscopically the tumor proved to be a carcinoma.

ALBANUS.

148. Death from marasmus. No meningitis. OPPIKOFEK.

d.—NASAL SEPTUM.

149. SUCKSTORFF. **On the submucous resection of the nasal septum.** *Arch. f. Laryngol.*, vol. xvi., book 3.

150. KILLIAN. **On the submucous resection of the nasal septum.** *Arch. f. Laryngol.*, vol. xvi., book 3.

151. HOLSCHER. **On operations on the nasal septum.** *Württ. med. Korr.-Bl.*, 1905, No. 28.

149. At KILLIAN's instigation, SUCKSTORFF collected and described the various proposals which had been made since Heylen (1847) to correct septum deviations by operation. The best procedure seemed to be Killian's modification (1899) of the Hartmann-Petersen operation.

ZARNIKO.

150. After several historical remarks, the etiology of septal deviations is described, and the indications for their correction given. The author's method of submucous septal resection is then described. The important feature consists in separating the two mucous surfaces of the septum by the aid of a long speculum in which he then can easily work as without the nasal cavity. The entrance into this cavity is furnished by the straight incision which is made at the beginning. All other technical peculiarities group themselves about this fundamental idea.

Every one interested in this operation, which is particularly indispensable to the rhinologist, will derive great profit from studying carefully the suggestions given by the author, which are based upon an experience of 220 cases. The description is facilitated by a number of excellent drawings.

ZARNIKO.

151. The author recommends for septal deviations the resection method of Krieg with the sacrifice of the mucous membrane on the stenosed side. The variation suggested by the writer, of removing the deviated portion of the septum in small pieces instead of removing as large a fragment as possible by two incisions of the scissors, does not appear to the writer to be an improvement.

MÜLLER.

c.—DISEASES OF THE ACCESSORY CAVITIES.

152. GERBER. On the rhinoscopic diagnosis and treatment of maxillary cysts. *Arch. f. Laryng.*, xvi., No. 3, 1904.

153. CHAUVEAU. Syphilitic affections of the frontal and maxillary sinuses. *Arch. internat. d'otol.*, etc., vol. xix., p. 414.

154. WITZEL. Iodoform emulsion for irrigation of the Highmore antrum. *Arch. f. Laryng.* xvi., No. 3, 1904.

155. GAVELLO. On the conservative treatment of chronic maxillary sinusitis. *Archivio italiano di otol.*, etc., vol. xiv., Nos. 2 and 3,

156. BORGONI. Mucocoeles of the maxillary and frontal sinuses. *Giornale italiano di laringologia, otologia e rinologia*, vol. v., No. 1.

157. HERZBERG. On serous meningo-encephalitis of nasal origin. *Berl. klin. Wochenschr.*, 1905, No. 10.

158. BREYRE. The radical cure of chronic frontal sinusitis. *Arch. internat. d' otol.*, etc., vol. xix., p. 429.

159. SEBILEAU. On the surgical treatment of chronic frontal empyema. *Annales des maladies de l' oreille*, etc., Jan., 1905.

160. ONODI. On the endonasal exposure of the sphenoidal cavity. *Arch. f. Laryng.* xvi., No. 3.

161. SCHLUNGBAUM. Sphenoidal cavities of large extent. *Arch. f. Laryng.*, xvi., No. 3.

162. BAUMGARTEN. On diseases of the bony sphenoidal walls. *Arch. f. Laryng.*, xvi., No. 3.

152. Most dentigerous cysts, which include periosteal cysts, or maxillary cysts, extend externally through the facial wall of the superior maxilla, or downwards to the hard palate, or upwards to the floor of the nose, and so may be recognized rhinoscopically by a prominence underneath the anterior insertion of the lower turbinal. The bluish protrusion is generally resilient or fluctuating and may contain normal or other mucous membrane. As to treatment, the smaller cysts should be opened from the nose. When they are larger, the anterior wall of the cysts should be resected and a flap of mucous membrane, with its base at the alveolar process, should be inserted. This formation of flaps is less desirable in empyema of the maxillary antrum when an opening is made from the canine fossa.

ALBANUS.

153. In ten syphilitics chronic suppurations of the accessory cavities were healed without operation by treatment with mercury. The purulent discharge was usually very slight.

OPPIKOFER.

154. Iodoform-alcohol is added to water, thus producing an emulsion of iodoform and water. After repeated irrigations with this fluid the discharge from the Highmore cavity is said to cease after a few days.

ALBANUS.

155. The author describes his favorite method of operation, which is a modified Krause operation. The instrument which is used to perforate the nasal wall of the sinus is described by several drawings.

RIMINI.

156. Two cases which were diagnosticated and operated upon by the author are described. The pathogenesis, diagnosis, and treatment are given.

RIMINI.

157. A driver, thirty-nine years of age, suffered from discharge from the right nose for one year, associated with frontal headache, malaise, indifference, loss of memory. The nose contained polypi and there was a frontal sinus empyema on the right side. After Kuhn's operation on the frontal sinus all symptoms disappeared until three months later, when severe headache radiated from the scar to both halves of the head. Another operation was performed and a defect was encountered in the internal table of the right frontal sinus. On incising the dura, cerebro-spinal fluid was evacuated under pressure. No symptoms for 14 days. Then without known cause, apoplectiform severe coma, with general convulsions, rigidity of the neck and back, anæsthesia, loss of reflexes, vomiting; pulse and temperature normal. Another operation was immediately performed and the right frontal lobe exposed. The dura was incised and bloody-watery fluid in large quantity evacuated. Various incisions were made into the frontal lobe, which were also followed by the escape of a watery fluid but no pus. Recovery without further symptoms. It was extremely remarkable to the author that the serous meningitis in its double appearance should cause symptoms differing so much in gravity and in kind.

MÜLLER.

158. BREYRE recommends Killian's operation for chronic empyema of the frontal sinus.

OPPIKOFER.

159. SEBILEAU, apparently after a large experience, has come to the conclusion that the obliteration of the frontal sinus, which

is attempted in Kuhnt's and Killian's operation, is not at all necessary for recovery. He operates, consequently, according to Ogston-Luc, by which procedure the forehead retains its normal configuration. He dilates the naso-frontal duct by removing the adjoining ethmoidal cells with a curette. He therefore joins the opposition which is commencing to make itself felt against the general employment of these methods. BOENNINGHAUS.

160. The anatomical relation of the anterior sphenoidal wall to the nasal cavities and to the accessory sinus are given by a number of measurements, and illustrated by instructive drawings. The author distinguishes on the anterior wall of the sphenoidal cavity not only a nasal part and an ethmoidal part, but also a maxillary and a frontal part. The methods of opening the sphenoidal cavity are then described, and the operations which can be carried out on the living are left for a later paper.

ALBANUS.

161. Five sphenoidal cavities are described which show an enormous extension in one or another direction and prove the difficulty of passing a probe into these cavities in the living.

ALBANUS.

162. A case is reported where a syphilitic ulcer behind the nasal septum healed after a course of inunction and iodid of potash, with a perforation of the septum and a large opening into the anterior wall of the sphenoidal sinus. Three cases are also reported of isolated diseases of the wall of the sphenoidal cavities where syphilis could be excluded, in the first case presumably due to arterial sclerosis, in the second to thrombosis or an embolus of the artery in hypoplasia of the aorta, in the last case from an embolic process (disease of the heart).

ALBANUS.

f.—OTHER DISEASES OF THE NOSE.

163. WOLFF. **Hay fever from a clinical, etiologic, and therapeutic point of view.** *Aus der med. Univ. Polikl. zu Berlin.*, Sonderabdruck aus: Senator Festschrift.

WOLFF. **On hay fever and on the proposed investigation of the action of hay-fever serum.** *Berlin. klin. Wochenschr.*, No. 21, 1905.

164. DENKER. **On the treatment of hay fever.** *Münchn. med. Woch.*, 1905, No. 19.

165. URBANTSCHITSCH. **On the treatment of hay fever.** *Münchn. med. Woch.*, 1905, No. 22.

166. CONTE. Tuberculous tumor of the nasal mucosa. *Bollettino delle malattie dell' orecchio*, etc., vol. xxiii., No. 8.

167. STREIT. Contribution on scleroma. *Arch. f. Laryng.*, xvi., No. 3, 1904.

168. GERBER. Remarks as to the preceding article on scleroma. *Arch. f. Laryng.*, xvi., No. 3, 1904.

169. GERBER. Scleroma in the Russian and German Provinces and its treatment. *Samml. klin. Vortr. Chirurgie*, No. 108.

170. HÉLOT. Results obtained from the use of penghawar in certain nasal operations. *Arch. internat. d'otol.*, etc., 1905, vol. xix., p. 798.

171. BOBONE. Total obstruction of the left nose of congenital origin. *Arch. internat. d'otol.*, etc., vol. xix., p. 402.

172. MINZ. Monolateral blindness after injection of paraffin under the skin of the nose. *Chirurgija*, January, 1905.

163. After the careful investigations of WOLFF with Dunbar's (Pollantin) and Weichardt's (Graminon) serum, their activity is not to be regarded as antitoxic. The author concludes as follows:

Pollantin and Graminon are substances which attenuate the action of the pollen endotoxin in patients suffering from hay fever.

This attenuation takes place during and outside of the true hay-fever time.

The action is favorable if the specimens are used prophylactically before the entrance of the pollen endotoxin.

The action of the sera is not to be placed as a parallel one to an antitoxin. There is, in fact, no satisfactory explanation of the serum.

HARTMANN.

164. DENKER has treated 8 cases of hay fever with massage of the nasal mucous membrane and has obtained good results. In 6 cases the attacks in the following years were milder or were absent. He believes that the massage, which was practised daily from 2 to 4 minutes, reduces the sensitiveness of the mucous membrane.

In 3 short cases of hay fever Denker tested Dunbar's toxin for its differential diagnostic importance, and employed it during the period free from attacks, but was not able to bring on an attack. Denker is going to continue these experiments with a more recent toxin.

SCHEIBE.

165. URBANTSCHITSCH has obtained good results with massage in hay fever.

SCHEIBE.

166. This paper gives an histological report of a case of tuberculous tumor of the nasal mucous membrane with a review of similar cases described in literature. RIMINI.

167. The author was able to examine for scleroma 150 to 200 cases living in the counties of Oletzko and Lyck in East Prussia. Two certain recent cases of scleroma were discovered with typical histological conditions. The first one presented the picture of chronic rhinitis, and can therefore be regarded as a rhinitis scleromata. In a third case, which appeared clinically as ozæna, the histological changes characteristic of scleroma were only to be found in the epithelium. The author cannot definitely state whether this case is to be regarded as scleroma or not. The interesting histological peculiarities must be read in the original. The author believes that all cases of scleroma should be announced. The two German areas of scleroma in Upper Silesia and Masuria should be placed under the control of special physicians, and should be visited by a medical commission every two or three years. Those patients who require hospital care should be admitted only to the special hospitals in Königsberg and in Breslau. ALBANUS.

168. The writer replies to Streit, who has objected to a case of scleroma published by the writer, that scleroma can be and must be diagnosticated from certain clinical conditions even without a positive histological condition. ALBANUS.

169. The author again draws attention to the importance of the proper diagnosis of scleroma in the Russian and German adjoining counties, because cases of scleroma are repeatedly appearing in East Prussia which probably derived their origin from an infection from Russia. This fact, which apparently is proven, shows the necessity that cases of scleroma should be observed, and that a quarantine should be instituted. A short diagnosis of scleroma with very good illustrations is added. BRÜHL.

170. In place of packing HÉLOT recommends penghawar after intranasal operations. The reviewer has also been using this remedy for one year, but does not feel inclined to give preference to it, especially for patients who are treated in the out-patient department. Penghawar is pleasanter for the patient; it, however, protects less securely than the packing against the unpleasantness or danger of an after-hemorrhage. OPIKOFER.

171. In a girl nineteen years of age the left choana was completely occluded by a bony cyst at the posterity extremity of the lower turbinal. At operation two tablespoonfuls of a yellowish thick fluid without odor were evacuated from this cyst. Recovery.

OPPIKOFER.

172. Three minutes after the injection of $\frac{1}{3}$ gram of paraffin (melting point 43°), in the case of a young woman of twenty-five with a syphilitic depressed nose, sharp pain set in in the left eye and the sight was lost. Pulse 48; vomiting. With the ophthalmoscope no arterial embolus could be observed. Shortly after œdema of the lids, exophthalmos, and in the dorsum of the nose there were two thrombosed areas. The termination in complete blindness of the left eye is described by the author as a thrombosis of the nasal veins which was transmitted by anastomoses to the ocular veins. It should be mentioned that the same patient a short time before had received an injection of an entire gram of paraffin at the same melting point without injurious results.

SACHER.

g.—NASO-PHARYNX.

173. HOLZ. **Recovery of two cases of bilateral exophthalmos and one case of chorea by removal of adenoid vegetations.** *Berl. kl. Wochenschr.*, 1905.

174. KREBS. **The after-treatment of adenectomy.** *Zentralbl. f. Kinderheilk.*, book 6.

175. ZWILLINGER. **Latent tuberculosis of the hyperplastic pharyngeal tonsil.** *Arch. internat. d'otol.*, etc., xix., p. 370.

173. (1) A boy seven years of age with adenoid vegetations and double-sided exophthalmos (presumably Graves' disease without cardiac or thyroid lesions). Ten days after the adenoids had been removed the exophthalmos disappeared. The adenoid vegetations recurred two years later with exophthalmos, which again disappeared after removal of the vegetations.

(2) A boy seven years of age with hyperplasia of all the three tonsils, bilateral exophthalmos (Graves' disease). Tonsillotomy exerted no influence on the exophthalmos, which did not disappear until two weeks after the adenoids were removed.

(3) A boy seven years of age with adenoid vegetations and chorea minor of several weeks' existence. The latter condition cured by adenectomy.

MÜLLER.

174. In the after treatment the author lays weight on medication with ferric iodid.

BRÜHL.

175. In thirty pharyngeal tonsils the author was unable to find tubercle bacilli or characteristic tuberculous changes in a single case. Animal experiments also resulted negatively. He therefore concludes that latent tuberculosis of the pharyngeal tonsil is rare and that the percentage of 4.2 of Gradenigo is too high.

OPPIKOFER.

MOUTH AND PHARYNX.

176. TRAUTMANN. **Two additional cases of so-called gland fever.** *Münchn. med. Wochenschr.*, 1905, No. 23.

177. LÖHNBERG. **On the diagnosis of gummatous tumors of the soft palate.** *Arch. f. Laryng.*, xvi., No. 3, 1904.

178. SCHMITZ. **On retropharyngeal abscess of small children.** *Protokolle des Vereins St. Petersburger Ärzte*, Sitzung. vom 16 Nov., 1904.

176. Two cases of pharyngeal angina, which were not quite straightforward, as the first was complicated with a faucial angina and the second with bronchitis. The author draws attention to the fact that in inflammations of the pharyngeal tonsil the glands of the neck are first involved and not the glands of the jaw.

He has recently examined children suffering with adenoid vegetations for the presence of this so-called one-day fever, and was able to confirm its presence in many cases. These attacks of fever generally disappear after removal of the pharyngeal tonsil.

SCHEIBE.

177. A patient seventy-three years of age, who has become emaciated on account of difficulty in taking his food, suffered for several months from pain in swallowing. An elastic smooth tumor, as large as a hen's egg, starting from the left tonsil, completely occluded the isthmus of the fauces. There were no glandular swellings. On incision a discolored fluid was evacuated. Prompt recovery after iodid of potash. The histological examination of an excised piece of tissue showed lymphatic tissue, granulation tissue, and necroses.

ALBANUS.

178. This trouble originates in primary lymphadenitis. The paths which lead to this lymphatic gland may start from the nose, from the pharynx, or from the middle ear. Fifty cases are reviewed. Most of these occur during the first year. The youngest patient was four months old; only one patient had reached the age of three years. The causation appears to be a coryza, an otitis media, or an angina; occasionally traumatism is given as

the cause. The prognosis, on evacuating the abscess at the proper time, is good. Of these fifty cases five died.

SACHER.

BOOK REVIEWS.

1.—The Surgical Treatment of Chronic Suppuration of the Middle Ear and Mastoid. By SEYMOUR OPPENHEIMER, M.D., New York. With forty-six half-tone plates. Large octavo ; four hundred and twenty-five pages. Cloth, \$6.00. P. Blakiston's Son & Company, Philadelphia, 1906.

This is an exhaustive and elaborate treatise on the subject of chronic purulent otitis in all of its phases. In addition to chapters on the normal anatomy and pathology, the greater part of the book is devoted to treatment. The usual operations, with their indications and after-treatment, are fully described in the order of their importance, from paracentesis of the drum membrane to the so-called "radical operation."

The treatment of the subject is novel and unquestionably a great deal of information has been industriously collected. The literature is carefully considered, but exact literary references are omitted.

It occurs to the reviewer that the book would be improved if the author's style were more terse and the contents divided into paragraphs with headings and with the employment of large and small type. The more important features would then receive the proper emphasis, and reference to them would be facilitated, though the latter condition is partly met by an excellent index.

A. K.

MISCELLANEOUS NOTES.

Professor Passow of the Charité Ear-Clinic, Berlin, has succeeded Professor Lucae, retired, as director of the University Ear-Clinic, Ziegelstr., Berlin.

Professor Heine, formerly 1st assistant at the University Ear-Clinic, Berlin, has accepted the call to Königsberg as extraordinary Professor of Otology.

Professors Bezold (Munich), Leutert (Giessen), Denker (Erlangen), have all been appointed full Professors of Otology.

The German Otological Society meets in Vienna, June 1st and 2d.

The Twelfth Annual Meeting of the American Laryngological, Rhinological, and Otological Society will be held, under the Presidency of Dr. Jas. E. Logan, at Kansas City, Mo., on Monday, Tuesday, and Wednesday, June 11, 12, and 13, 1906.

The Thirty-ninth Annual meeting of the American Otological Society will be held, under the Presidency of Dr. E. Grüning of New York, at the N. Y. Academy of Medicine, 17 West 43d St., New York City, on Tuesday, June 26, and Wednesday, June 27, 1906, at 10. A. M.



ARCHIVES OF OTOTOLOGY.

SYMPTOMS AND TREATMENT OF SINUS AND JUGULAR THROMBOSIS, WITH THE REPORT OF FIVE CASES.

BY B. R. KENNON, M.D., NORFOLK, VA.

(With five temperature charts.)

IN considering the symptoms of the affection under discussion, I think that much has been written that is confusing, even misleading, many observers having laid down too hard and fast rules, particularly in regard to the temperature curve and the occurrence of chills.

These observations are based on fifteen cases, five of which have been in my own practice and will be described in detail later.

Among the symptoms and signs which have been enumerated are: chill, temperature, pulse, respiratory, digestive, cutaneous, mental, and eye symptoms; and those appearances peculiar to the mastoid and neck.

First: Temperature. This is the most important of all the symptoms and signs of sinus and jugular involvement and is usually the only one that can be depended on. When characteristic, the sinus should be opened regardless of other symptoms.

The temperature in this affection is that peculiar to pus absorption, and, if typical, is characterized by a sudden rise, followed by an equally sudden fall. This very characteristic temperature curve has led to much error in the description of this, our most important symptom. For a glance at the accompanying charts shows, in several instances, a gradual rise, followed by a gradual fall, extending over a

period of from six to twelve hours; and, in some cases, as much as twenty-four. Another fallacy regarding the temperature is that it should reach 104° , 105° , or 106° F. If we wait long enough before operating, the temperature *will* reach the above figures, but there are many cases, especially after the mastoid has been cleaned out, where a temperature ranging from 101° to 103° is sufficient reason for us to open the sinus.

Second: Chill. This may vary from a pronounced rigor to merely chilly sensations of the extremities, and may escape detection unless carefully watched for. I think the importance of this symptom has been overrated. If present, it is perhaps as important as the temperature, but the point I especially wish to emphasize is its frequent absence, occurring in only one of the five cases here reported.

Third: Respiration is dependent on the temperature, being rapid when the temperature is high and going back to normal, or nearly so, when the temperature reaches normal.

Fourth: Pulse is usually somewhat rapid, and when the temperature rises often goes to 140 or 150 and scarcely ever gets back to normal even though the temperature does so.

Fifth: Cutaneous. When there are chills they are always followed by sweating, but when there is no chill the skin is parched and dry. The yellow hue of the skin is not observed until very late in the septic process.

Sixth: Digestion. The fetid breath, cracked lips, and sordes on the teeth have often led to a diagnosis of typhoid, as occurred in Case 2 of this series.

Seventh: Mental. The mind is not especially affected, being influenced as in other diseases by the temperature.

Eighth: General. In the early stages of the disease, when the temperature is low, the patient feels very well and we are soothed with the false hope that he is better, but if the condition is not relieved there is a rapid loss of flesh and strength and the marked emaciation and debilitation are striking.

Ninth: Eye symptoms. Optic neuritis in the cases coming under my observation has been very rare; indeed, it was more frequent in cases of epidural abscess than in sinus thrombosis.

Tenth: Local symptoms. I must confess to an inability to judge of the contents of the sinus from knowledge gained by an inspection of the mastoid, so cannot understand the statement that an œdema over the mastoid speaks for sinus thrombosis, nor have I ever felt the cord-like swelling and induration over the course of the jugular. After the sinus has been exposed, much stress has been laid on its appearance and "feel" as an aid to diagnosis. A discoloration of the sinus is of the slightest significance from a diagnostic standpoint. The presence of granulations on the sinus wall argues against its involvement, for this is a barrier which nature has thrown out between the infective process and the blood current. The aid in diagnosis gained by a palpation of the sinus is in many cases misleading, and I have seen uninvolved sinuses opened and involved ones left alone by relying on this sign. Furthermore, granulations on the sinus wall greatly lessen the ability to detect by palpation the presence of a thrombus. Nor has the experiment of Dr. Fred. Whiting been of any aid to me, and should the sinus be clotted, especially with a parietal thrombus, I think that this experiment is positively dangerous, for by the firm pressure and milking required we may force particles of infected matter into the circulation.

The presence or absence of pulsation is of no significance.

Treatment.—Let me emphasize in the beginning the great necessity of rapid operation, for these patients are, very frequently, exhausted by the disease before a diagnosis can be established, and they bear the anæsthetic badly. I think that all of us have too great a respect for the sinus, making us put off opening it longer than we should. If the temperature has been indicative of sinus involvement, we should open it at the time of the mastoid operation even though its appearance and feel do not indicate the presence of clot. It will be found in many cases that the bony wall is softened and frequently the sinus exposed by the infective process, in which case further exposure for inspection and treatment can be most readily gained with the rongeur. While I know that the rongeur subjects the sinus to more or less pressure

I think it decidedly a safer instrument than the chisel. If we use the latter, it requires the greatest care, thereby sacrificing valuable time. Another objection to the chisel is the great danger of accidentally wounding the sinus either with its edge or by driving a spicule of bone through the wall. An accidental wounding of a sinus which bleeds is most unfortunate, because it is done at a time when the field is not prepared, the flow of blood greatly hampering us in any further work in the wound and obscuring a proper inspection of the sinus. Should the bony sinus wall be not eroded or softened, the chisel cutting at a tangent to the vessel is the instrument *par excellence* to secure an initial opening. When the sinus has been sufficiently exposed—and I mean by this from the knee, or above it if necessary—well down toward the bulb and it is decided to open it, two gauze rolls are made, one placed above and the other below where we wish to make pressure. The operator takes one and the assistant the other, but no pressure should be made until there is free bleeding, for we may thus detach pieces of the clot and force them away from the wound, whereas if the blood is allowed to flow out of the wound, viz., in the direction of least resistance, these particles will be swept out of the circulation. After free bleeding is established from either direction, pressure can then be made, the interior of the sinus wall examined, and the other end looked after. An accident to be avoided in a thrombosed, contracted sinus is going through both walls of the sinus and entering the dural cavity. I have seen this accident happen.

Should the thrombus be situated either primarily or secondarily in the bulb, we should at once expose and resect the jugular vein, for from the anatomical arrangement of the parts the bulb cannot be efficiently curetted, and it is dangerous and unsurgical to loosen in a blind tube an infective clot which may be swept toward the heart. Any one who has seen the alternate filling and collapse of the jugular after its exposure cannot fail to be struck with the negative pressure, amounting to suction during inspiration. It is unnecessary to describe in detail the resection of the jugular vein, but I wish to call attention to one or two points.

The first and most important is rapid operation, 30 minutes being sufficient time in any case in which to resect the jugular.

In preparing the neck the greatest gentleness must be employed, and in no case should there be violent scrubbing, as by this means particles of infective material may be loosened and carried into the circulation. Instead of removing the vein from the base of the skull to the clavicle, thus leaving the infected upper end to drain into and infect the neck wound, I have in my last cases resected the vein only from the facial downward and brought the upper end out of the upper angle of the wound, by this means successfully avoiding infection.

In every case in which the neck wound has been closed at the time of operation it has become infected, so I now leave it open and pack it, drawing it together with adhesive strips at the first dressing.

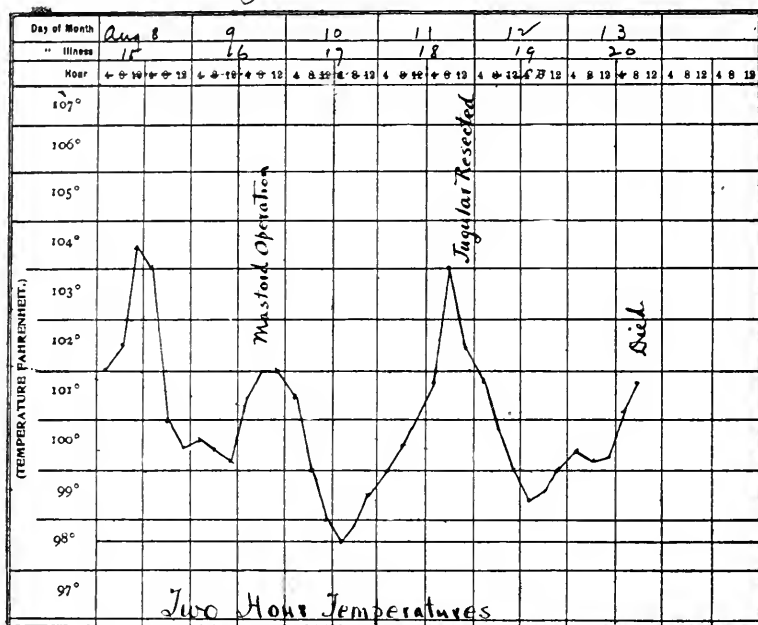
CASE 1.—J. B., col., aged ten. Walked into my clinic at St. Vincent's Hospital Aug. 9, 1901. The child's mother stated that a companion had run a stick into the patient's ear while he was asleep three weeks previously, since which time the ear had been discharging. There had been much pain for three days prior to my seeing him. Otoscopic examination revealed a profuse purulent discharge which upon being wiped away showed a large perforation in the posterior inferior quadrant of the membrana tympani. Mastoid exquisitely tender and œdematous. T. 102° F.; P. 95. Patient was admitted to hospital at 3 P.M., and canal ordered douched every two hours with bichloride solution 1:4000.

The temperature was 104.5° at 6 P.M., but gradually dropped to 100° F. in the next 12 hours. Operation 6 hours later disclosed mastoid antrum and cells filled with granulation tissue and pus. The sinus groove was not softened or discolored, so the sinus was not exposed.

By 10 A.M. on the day following, the temperature again reached 104° F. and it was decided to expose and open the sinus. Under chloroform the bone was removed from over sinus with chisel and rongeur for about 1 1/2 inches. The sinus was then slit with a knife and found to be occluded with a firm, partially organized clot extending for about one inch beyond the knee in its

torcular end. This was removed with a curette and free bleeding established. I now tried to establish the circulation from below, but found this impossible, although the bone was removed well down in the direction of the bulb.

NAME Care I Jno B WARD.

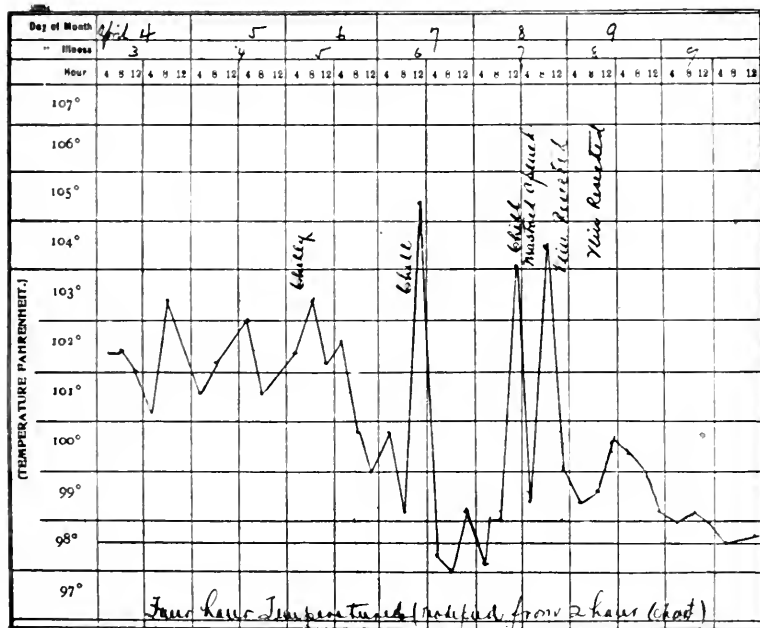


The jugular was now exposed and its wall was found to be thickened and its lumen occluded down to the entrance of the facial. It was tied off just above the clavicle and cut between two ligatures and was excised at its exit from the jugular foramen. The wound closed and the patient returned to bed at 3.30 P.M. His condition was very good until 12 o'clock the next day, the temperature then being 102° F., when the patient suddenly collapsed and died in about two hours. I have always been unable to account for this sudden collapse and death. An autopsy could not be obtained.

CASE 2.—I was called April 1, 1902, to see Philip C., aged seven. He had lived up to six months previously in a malarial district

and had had frequent attacks of chills and fever. Two days previous to my first visit the child had complained of slight earache and had a temperature of 104° F. The next day he suffered almost continuously with nausea and vomiting with temperature of 102° in the morning and 104° in the afternoon. I was now called and found the child listless and fretful, and still vomiting everything taken. He complained of chilly sensations during the day and the temperature was 102.4° -. The mastoid showed only moderate tenderness. Otoscopic examination showed a bulging membrane with a very small perforation, so the membrane was thoroughly divided under nitrous oxide and a Leiter coil applied.

NAME Barrett Philip C. WARD.



The next day the temperature reached 103.6° and I strongly advised operation, as I did every day until it was finally consented to. For the next two days the condition was unchanged, the temperature remaining between 102° and 103° , but for the following 48 hours the general condition and temperature curve were

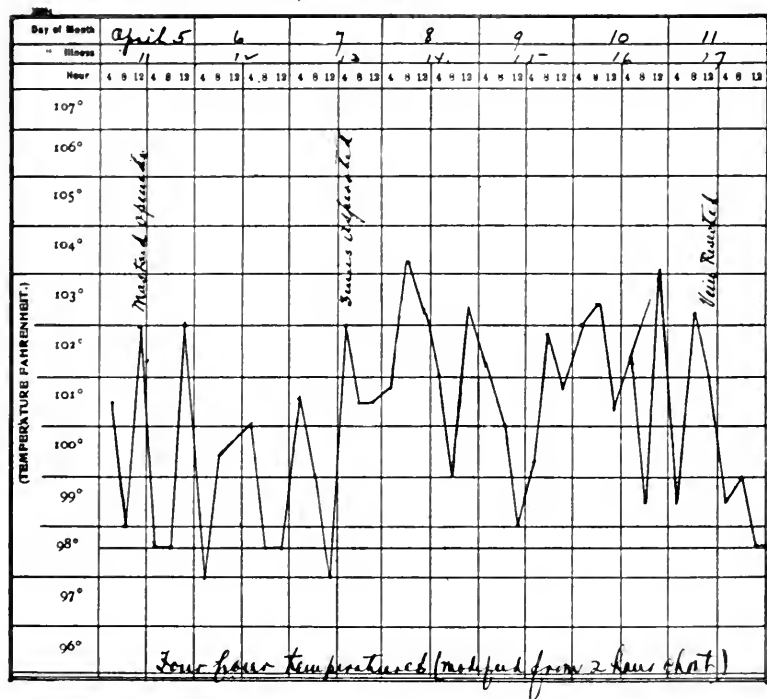
much more favorable, but this improvement was followed by a marked chill and temperature of 105.4° , with sudden return to normal, there to remain for 24 hours, when he had another chill and a temperature of 104° .

I would say in extenuation for this criminal delay that I had strongly advised operation daily for seven days. It was now consented to and exploration of the mastoid showed a very much involved process and an epidural abscess on the anterior sinus wall in front of the knee. The wall itself was not discolored and had a normal "feel" so it was not opened, the amount of pus already found being thought sufficient to account for the symptoms, but should such a case occur with me now I would open the sinus regardless of all local signs. Twelve hours after the operation on the mastoid the patient had another chill, followed by temperature of 104.5° . The sinus was now opened, revealing a well organized clot extending upwards to within an inch of the torcular. No bleeding being got from the jugular end on opening the sinus as low down as possible, the usual jugular exposure was made, showing the clot extending one inch into the neck below the bulb, so the vein was resected from this point to the clavicle. Wound packed with gauze. The temperature never again rose above $100\frac{1}{2}^{\circ}$ and the recovery was rapid and uneventful.

CASE 3.—Va. B., age six years. Referred to me by Dr. Chas. T. Parrish, of Portsmouth, Va., with history of earache, some discharge, and temperature of 103° at times, taken irregularly for three days previously. Examination showed slight discharge in the canal and a small perforation in the anterior inferior quadrant of a bulging membrane. Mastoid exquisitely tender. Was immediately sent to hospital and the *Mt* thoroughly incised under nitrous oxide. The temperature reached 103° six hours later, and as there was a profuse discharge and the tenderness had not lessened, I operated at 2 P.M. the next day, and found only a moderate disease of the mastoid bone but the antrum and tip cell were filled with sero-purulent fluid. The sinus groove was somewhat softened and the sinus was exposed over a small area, but no granulation or discoloration was perceived. Seven hours later the temperature reached 103° , but fell suddenly to 98° . During the next 36 hours the temperature was irregular, ranging from normal to 102° , and at the end of the above-mentioned pe-

riod went to 103°. I now did a very unwise thing, viz., aspirated the sinus, and as I got fluid blood, was misled as to its condition, which caused me to delay the resection of the jugular for three days longer than I otherwise would have done. In view of the subsequent findings this was originally a case of primary bulb thrombosis which had not extended up to the point where the needle entered the sinus $\frac{1}{2}$ inch below the knee. Twelve hours after the aspiration the temperature reached 104.2°, and had I not

NAME Case III, Krogman, B. WARD.

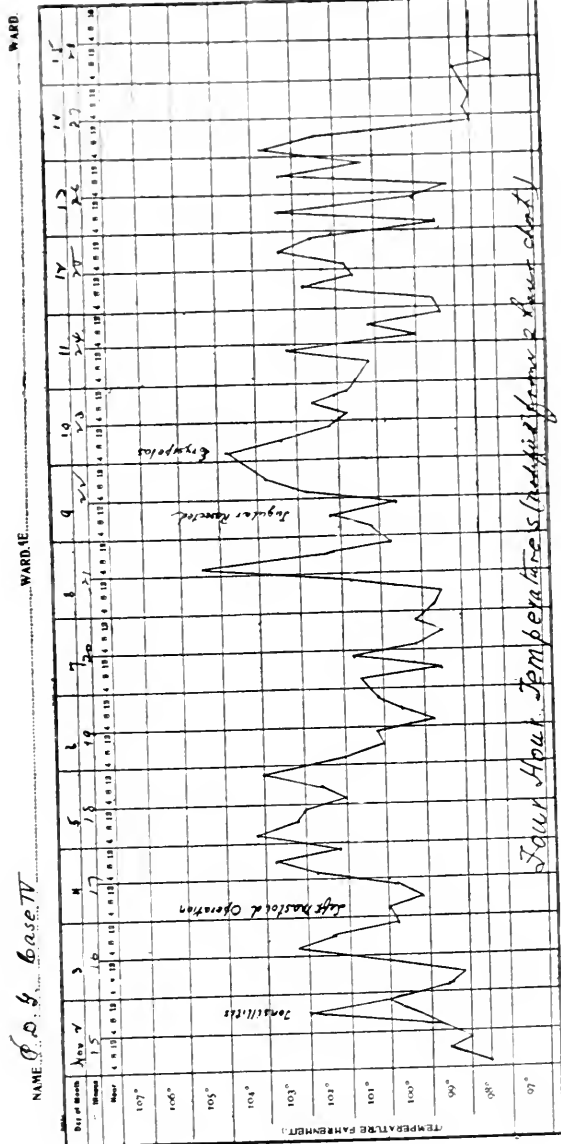


been misled by the result of the aspiration, I would now have opened the sinus instead of waiting for three days while the temperature played between 100° and 103° to finally again reach 104° . I then opened the sinus and resected the jugular. I first made a thorough exposure of the sinus from the knee almost to the bulb.

I then slit it thoroughly with a knife, beginning below and going upward to the knee. The sinus was found filled with a soft clot not adherent to its wall, and when the knife reached the knee the blood pressure gradually forced out a clot fully two inches in length and rat-tailed in shape, which must have reached almost to the torcular. I did not attempt to get bleeding from below, but immediately exposed the vein and found it firmly clotted for an inch after its exit from the foramen. I tied it off below just above the clavicle and, after having tied off its facial and lingual branches, cut it off just below the bulb. The wound was then closed. The temperature was normal six hours after the operation, and the patient made an uneventful recovery except for infection of the neck wound.

CASE 4.—P. D. G., aged twenty-one months, was referred to me by Dr. Lomax Gwathmey, of Norfolk, on Nov. 2, 1904, who had seen the patient for the first time 24 hours previously. The mother stated that the child had had earache 2 weeks previously lasting for several hours, followed the next day by a discharge from both ears, which had continued. She had taken the temperature every day, and especially when the child seemed to have fever, and on some days the temperature was as high as 103° , while on others, and for several succeeding days, it was normal.

This case was complicated by bronchitis and a follicular tonsillitis, either of which, but especially the latter, might have caused the temperature. The next day the temperature fell to normal, and did not rise again for 24 hours, when it again reached 103° . At this time an enlargement of the cervical glands developed on both sides, just behind the angle of the jaw, but more marked on the left. I now advised operation, and after some delay it was consented to. I operated on the left mastoid solely on account of the greater involvement of the cervical glands on that side, as from otoscopic examination both sides appeared to be equally involved. There was only moderate mastoid involvement, and as the bony groove was neither discolored nor softened I did not expose the sinus, but felt so sure of sinus involvement, and realizing the importance of not opening the uninvolved sinus first, I exposed the vein, and while I was of the opinion that the flow of blood from above was not in normal amount consultants thought otherwise. So the vein was left alone, and the wound closed. In 24 hours succeeding the mastoid

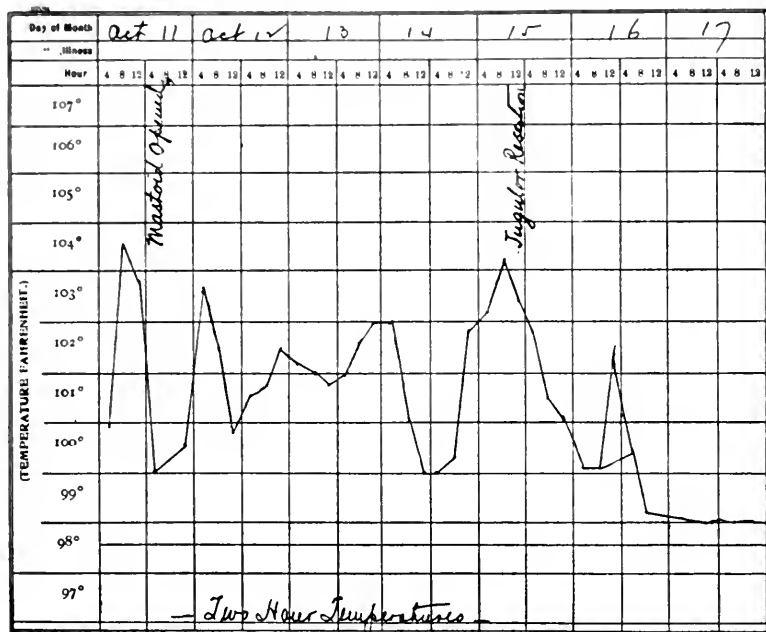


operation the temperature went to 103.8° , then to 102.2° , then to 104.2° , when it again receded to 102° , to go in the next 12 hours, viz., forty-eight hours after the operation on the mastoid, to 104° . It gradually receded to $100\frac{1}{2}^{\circ}$, and remained practically at this for the succeeding 6 days. On the afternoon of the sixth day it went to $105\frac{1}{2}^{\circ}$. I operated the next day, first exploring the mastoid of the right side, since the right ear was still discharging, but found pus confined to the antrum. The left sinus was then exposed for about $1\frac{1}{2}$ inches and incised, from below upward. It was found occluded by a well organized clot extending for $\frac{1}{2}$ inch beyond the knee in its torcular end. The clot was removed and a free flow of blood established, from above. There was no bleeding from below, although the bone was removed, and the sinus slit almost to the bulb. I now reopened the neck wound, extended it to the clavicle, and found the vein occluded for $1\frac{1}{2}$ inches below its exit from the jugular foramen. The vein was then tied off just above the clavicle, and resected up to the entrance of the facial, and upper end brought out at the upper angle of the wound, and the wound packed without an attempt to close it. Twenty-four hours after the jugular resection the temperature reached 103.8° , and the next day 104.8° , when an erysipelas of the mastoid wound, auricle, and cheek developed, to subside in the next three days, but the temperature ran irregularly for ten days longer, frequently reaching 103° , and on the last day 103.8° , after which it suddenly returned to normal and there remained.

CASE 5.—A. S., col., aged fifteen years, walked into my clinic at St. Vincent's Hospital Oct. 10, 1905, with the following history: Had had a running ear since childhood, which never gave any special trouble until three weeks ago, when she began to have severe pain in the ear and side of head, which had continued with remission of a few hours to several days, until she presented herself for treatment. Otoscopic examination showed a canal filled with foul-smelling, thick, yellow pus which when wiped away showed absence of *Mt* and cholesteatomatous material at bottom of canal. Swelling under sterno-mastoid indicative of Bezold's mastoiditis. T. 100.9° F. Was admitted to hospital at 3.30 P.M., and the temperature reached 104.4° at 8 P.M. Operation 8 A.M. Usual mastoid incision. The cortex seemed normal, but when the periosteum was retracted forward it was found that the anterior wall of the mastoid and posterior bony canal were

absorbed. The cortex was then cut away, and the whole cavity of the mastoid was found to be filled with a cholesteatomatous mass from the tip to the inner table of the middle fossa and backward beyond the sinus. Neither the inner table of the mid-

NAME base T. Annie S. WARD.



dle fossa nor the bony sinus wall was eroded; and both were hard and white. An opening was made to the neck by removing the tip and about four drachms of pus evacuated from under the sterno-mastoid. The temperature reached 103.5° three hours after the operation, and then gradually declined to 100.8° , and did not reach 103° until the next day, viz., twenty-four hours after the operation. It again gradually rose during the next twelve hours to 104.2° , and again gradually receded during the next twenty hours to 100° . I operated the next morning, by first exposing and tying off the vein. I found the vein very small to the common entrance of its facial and lingual branches, having no blood coming from above and remaining empty when cut off from below. I then exposed the sinus and opened it freely, when

I got a free flow from above and a parietal clot from below with the curette, but the thrombus was confined almost entirely to the bulb, so that it could not be removed. Having tied the vein below just above the clavicle, I brought the upper end out of the upper angle of the wound and packed the wound without suturing it. The temperature was 102.4° twelve hours after the jugular resection, but went to normal three hours later and never again rose.

INFECTIVE SINUS THROMBOSIS; THE VARIETIES OF GENERAL INFECTION AND TREATMENT.¹

BY ARNOLD KNAPP, M.D.

Forms of systemic Infection.

THE general symptoms of sinus thrombosis are dependent on the form of the infective process; as the resulting clinical pictures are of great assistance in determining the method of treatment I should like to describe these more fully.

In the temporal bone, as in the body elsewhere, we can distinguish two forms of wound infection from pyogenic organisms. First, the form characterized by metastases, with interrupted, transient infection of the general circulation; and second, the form without metastases, with continuous (toxic and bacterial) infection of the general circulation. These two forms may be combined.

The metastatic or first form of infection is the well-known one and the one usually spoken of as pyæmia. This in the ear is produced by staphylococci, streptococci, rarely pneumococci. It is characterized by severe rigors, a typical remittent temperature curve, pronounced general symptoms, and the presence of metastases.

The form without metastases results from continuous infection of the circulation with bacteria and their poisons. The streptococcus is the most frequent bacterium. The

¹ Read before Section on Otology, N. Y. Academy of Medicine, March 8, 1906.

clinical picture is that of a very severe general infection; the temperature remains steadily high, the rigors are less marked or absent. Associated with marked prostration there may be cerebral disturbances, diarrhœa, jaundice, and cutaneous eruptions. The wound appears unusually dry, discolored, or covered with exudates. Pus and granulations are not formed. Finally, in the most extreme form of this general infection, sometimes spoken of as otitic sepsis, the clinical picture is governed by excessive toxæmia, which may rapidly lead to cardiac paralysis. Putrefactive (anaërobic) bacteria are sometimes associated with pyogenic organisms (colon group); this increases the virulence of the pus-producing bacteria (streptococcus). The local infection shows a thin, fluid, bloody pus (ichorous), with gas production. In a case of sinus thrombosis complicating cholesteatoma which I recently operated upon, the wall of the sinus was necrotic, the lumen was filled with gas, the disintegrated thrombus had the same penetrating fæcal odor which appendicular abscesses so frequently possess. The patient died of pneumonia.

Theoretically we may speak of a bacterial general infection (bacteriæmia) or of a toxic general infection (toxinæmia) as one or the other factor predominates. In the bacterial general infection, the bacteria increase in the blood (septicæmia). In the toxic form (as in tetanus), the toxins developed at the site of infection spread over the body. This gives a pronounced clinical picture with a negative condition of the blood for bacteria, and is chiefly caused by mixed infections, especially with putrefactive bacteria; it is sometimes spoken of as septicopyæmia.

It is therefore evident that every general infection from the ear need not follow the typical pyæmic character. The chills may be absent, the metastases may be absent, the temperature remains continuously high, the toxic poisoning becomes early manifest by the bodily prostration, septic pneumonia rapidly supervenes unless radical operative measures are early instituted.

As to the origin of systemic infection, practically all

severe infections starting from the temporal bone are transmitted by the venous sinuses, except possibly those which originate from the tympanic mucous membrane in young children. The conception osteophlebitis pyæmia of Koerner though possible is very rare, and need not be considered as it runs a mild course and the cases recover. The lesion in the sinus wall may be inaccessible as in the case of the jugular bulb, or it may only be demonstrable by microscopic examination (as in the case reported by Jordan, *Archiv f. Ohrenheilk.*, vol. xlv., 1898).

The histology of sinus thrombosis is not well understood. We are apt to forget that the wall of the sinus is the part first affected; the disease extends along this wall presumably by continuity and by the anastomosing lymph spaces; the thrombus in the lumen is a secondary product, which is to a certain extent nature's endeavor to limit and localize the disease to the sinus wall.

Treatment.

A proper appreciation of the form and intensity of the general infection is of as much importance as the local condition in the selection of the proper treatment.

I shall not describe each author's practice, as after a study of the literature I do not find at the present day that opinions on treatment differ to any marked extent, except that some ligate the jugular vein in every case, and others do so only on distinct indications. I shall return to this later.

If at operation we find periphlebitis of the sigmoid sinus which has caused no symptoms or remittent fever and chills we are justified in not attacking the sinus, but awaiting the outcome of our mastoid operation.

Obturing Thrombosis.—If the sinus shows changes in consistency and color suggestive of thrombosis, with the signs of phlebitis, and the symptoms point to a general infection, the sinus must be explored after being laid bare from the upper knee to near the bulb. It is very important to remove the bone at least an inch beyond the presumable peripheric end of the thrombus; in the other direction the

bulb calls a halt. The exploration can well be made with a fine knife such as a cataract knife. If the contents are solid, the incision is prolonged and the entire outer wall excised. The thrombus can then be easily removed. The mere free return flow of blood does not indicate that the limits of the thrombosis have been reached; the inner surface of the parietal wall will give us much more reliable information and this surface must be carefully inspected. Last spring I lost a patient from meningitis where at two successive operations the circulation was restored peripherically and the outer wall of the sinus excised; nevertheless the disease continued, as shown at autopsy, along the sinus wall to the point where a tentorial vein became involved, and the infection was propagated to the meninges.

The treatment of the proximal end of the thrombus is much more difficult, and one which requires the consideration of several other features. If the proximal end is near the jugular bulb and is disintegrated, or if the disintegrated part of the thrombus is contiguous to the bulb, or the general infection is severe, even though the proximal end looks healthy, the jugular vein should first be ligated because this end of the thrombus must be removed.

Theoretically it is probably correct to say that every thrombus is infected, though the degree of infection in the periphery of a thrombus may be so slight as not to prevent its organization and thus form nature's barrier against general infection. There is no reason why we should not profit by this natural process in the vicinity of the jugular bulb.

If the proximal end seems recent and healthy, though acknowledging that we cannot judge the degree of infection of the clot by its appearance, and if the disintegrated part of the thrombus is not contiguous to the bulb, and the patient's condition is good with only mild symptoms of general infection, this part of the thrombus need not be touched and the patient observed.

A very important point to my mind is frequent dressings in these sinus cases. If the symptoms do not abate in 24 to 48 hours, or signs pointing to further absorption from dis-

integration of the bulbar clot present themselves, the jugular vein must be ligated and the bulb cleaned out.

If the sinus proves to contain fluid blood, the condition is much more difficult to treat, and our treatment again varies according to a variety of conditions.

Parietal Thrombosis.—If the sinus wall be affected (phlebitis), a parietal clot is presumably present. Our treatment would vary, according to the gravity of the systemic infection, from thoroughly removing the primary source of infection in the temporal bone and doing nothing to the sinus, to shutting off of the circulation to either side of the presumptive thrombus, as suggested by Whiting, and completely resecting the intervening and affected sinus-wall; if this area approaches the bulb, we must be guided by the same conditions above enumerated in speaking of an obturating thrombus, whether to ligate the jugular vein and invade the bulb or not.

If no lesion of the wall is present, and the sinus contains fluid blood, the sinus may be involved in an unusual situation, or the disease may be situated in the bulb. The following case illustrates an unusual localization of sinus thrombosis which I reported in the ARCHIVES OF OTOTOLOGY, vol. xxxi., 1902. In a case of chronic purulent otitis with acute mastoiditis, symptoms of severe pyæmia led to an exposure of the sigmoid sinus. The sulcus was healthy, and sinus wall thin and unaffected; the sinus contained fluid blood. The patient died of meningitis, and at autopsy it was found that ostitis in the upper and posterior part of the mastoid process had involved the posterior surface of the superior petrosal sinus from which the cerebellar wall of sigmoid sinus became involved and at autopsy presented an extensive mural thrombus.

A parietal thrombus in the bulb cannot be exposed. Methods have been suggested whereby an occlusion of the bulb can be made out, but incomplete thrombi are much more frequent and are often associated with most intense symptoms of general infection where the practice of these methods cannot be regarded as free from danger.

Primary Bulb Thrombosis can usually only be diagnosed by exclusion, in the presence of systemic infection when the sigmoid and other accessible sinuses seem normal and contain fluid blood. The diagnosis is made more probable if the disease in the temporal bone is principally situated in the tympanum or in the aberrant mastoid cells about the facial nerve. The anatomic variations in the position of the jugular bulb, especially its changing relation to the inner tympanic wall, where it sometimes displaces the labyrinth upward, I think explain how the bulb may be primarily involved. The lesion tends to remain mural; extension is more apt to take place in the direction of the upper end of the jugular vein rather than that the thrombus becomes complete. When the vein is invaded, local signs in the neck are usually present. The condition in all cases of primary bulb thrombosis is not necessarily grave. I remember distinctly two of my own cases in young adults in whom recovery took place, in one without operation, in the other after operation which apparently had no influence on the course of the disease.

If, however, we have reason to suppose a thrombus in the bulb and the general symptoms are severe, the jugular vein should be exposed, and, if possible, ligated above the facial vein. The sigmoid sinus should then be peripherically shut off by pressure and the sinus broadly opened as near as possible to the bulb. On the following day, thrombosis having occurred in the jugular vein below the bulb, this vein should be slit up so that we have access to the bulb from both directions, thus preventing a purulent disintegration of the thrombi in the contributory veins and sinuses. The jugular vein above the ligature serves in these cases as a drainage tube. I think this plan of treatment applies especially to the severest form of general infection, the septicæmias or septicopyæmias, where the sigmoid sinus is found normal and we must assume a mural clot in the bulb. The reason why a mural clot or a lesion in the bulb often is overlooked at autopsy has been explained by Leutert, who has shown that the region of the bulb can only be satisfactorily examined after the tem-

poral bone has been taken out of the skull together with the jugular vein, and in many cases this region must, in addition, be subjected to a microscopic examination.

The value of *the ligation of the jugular vein* has been recognized for many years, though the views on the indications for this procedure are still divided. While some advocate ligation in every case, many, including such experienced surgeons as Macewen, Ballance, Jansen, do so only on distinct indications.

First of all, statistics do not help us in solving this question, as the cases subjected to this operation differ too widely in the severity of the general infection and in the time of operation.

According to Heine, the importance of collateral paths and reversal of blood current is not sufficiently recognized in the continuation of systemic infection. A patient with parietal bulb thrombosis, where I shut off the sigmoid sinus and jugular vein, continued a pyæmic fever curve for nine weeks with thirteen different metastatic foci.

Moreover, Jansen has shown that ligation of the jugular vein facilitates extension of thrombosis to the inferior petrosal and cavernous sinuses. Macewen mentions deep cervical abscesses as extensions along the condylar veins. Ligation of the jugular vein causes a thrombosis of all the channels about the bulb and directly facilitates a septic disintegration. It has long been known that ligation of the jugular vein may be followed by serious danger to the brain, and even death from an interference of the circulation. In the January meeting of this Section, Dr. Eagleton read a most interesting account of a case in question which he had observed, and cited the literature on the subject. These conditions have been explained in the fatal cases at autopsy by the presence of anatomic variations in the lateral sinus and jugular vein of the opposite side.

Hoffman¹ has even reported a case where severe brain symptoms occurred in a case of extensive sinus thrombosis following injury to a sinus during a mastoid operation, where

¹ *Zeitschrift f. Ohrenhkk.*, vol. xxx., 1896.

the symptoms all disappeared on relieving the excessive cerebro-spinal fluid, and the patient recovered.

These facts prove conclusively that ligation of the jugular vein has distinct disadvantages and even dangers to which it does not seem proper to subject a patient unless the conditions actually demand it; it, on the other hand, must be remembered that a similar interference of the circulation, as after ligation of the jugular vein, occurs in many cases from the morbid process in the sigmoid sinus and bulb. In any case it would be well, if the conditions permit, to ligate the jugular vein above the facial vein, as this vessel fulfils an important function in the collateral circulation.

The ligation of the jugular vein, therefore, seems to me to be indicated when we are forced to attack a clot in the bulb, and in cases of primary bulb thrombosis with severe systemic infection. The wisdom of ligation and excision of the vein, when it is itself involved, is generally admitted.

Many cases of sinus thrombosis recover without operation, and again it must be acknowledged that, even with the most radical measures, cases of sinus thrombosis die. Of greatest influence is the time of operation. It has been repeatedly shown that prognosis in early operation is much better, and that these cases often get well with relatively inextensive operations.

Metastases sometimes appear after the most radical operations, though they may have been present before operation, and upon the outcome of the contest of the body with these depends the success of the operation. The importance of general treatment need not be mentioned. The pulse rate is a most valuable indication of the general condition. The infusion of a physiological salt solution is our most potent agent to counteract the general infection. As early operation is essential to success, prophylactic measures are in order. These demand careful examination of mastoiditis cases, early operation, especially when tenderness exists along the posterior margin of the mastoid process, and in the chronic cases early recognition of the dangerous cases, especially those complicated with cholesteatoma.

TWO CASES OF GRAVE COMPLICATIONS OF PURULENT EAR DISEASE OPERATED UPON AND REPORTED

By J. STODDART BARR, M. B., CH. B., GLASGOW,

ASSISTANT SURGEON TO THE GLASGOW HOSPITAL FOR DISEASES OF THE EAR,
NOSE, AND THROAT.

I. A fatal case of septic thrombosis of the lateral sinus, secondary to chronic otitis media purulenta in left ear, and complicated with septic infarctions in the right lung.

The patient was a little girl, seven years of age, who had had a continuous discharge from the left ear for a year. During the eleven days before admission she had a dozen severe rigors, with violent oscillations of temperature, from normal to 104° F. There were also frontal headache and pain in the left side of the neck. She vomited once or twice at the beginning of the illness. The discharge from the ear was profuse and fœtid. There was evidence of the early stage of optic neuritis in both eyes. The breathing was accelerated, with frequent cough. A few moist râles were heard, and also tubular breathing over a restricted area around the inferior angle of the right scapula. The radical mastoid operation was performed, clearing out pus and granulation tissue. The sigmoid sinus was exposed, and found converted into a yellowish sloughy-looking mass surrounded by and partly filled with pus. The bulb of the internal jugular contained a solid thrombus. The sinus was slit open backwards and cleared of septic disintegrated thrombi to within one and a half inches of the torcular when a gush of blood appeared. After the operation, the pulmonary symptoms continued to increase, and the patient died two and a half days after admission to the Hospital. Post-mortem examination was conducted by Dr. James Walker,

and showed well-marked septic infarctions of the right lung. Bacteriological examination showed the presence of pneumococci and streptococci and also a large bacillus, which did not grow on the culture media, and did not give the staining reactions of the acid-fast group of organisms.

In this case it is highly probable that had operative treatment been employed a few days earlier, before the pulmonary infection had supervened, a different result might reasonably have been expected. It should be emphasized that, when rigors with violent oscillations of temperature appear in connection with a purulent middle-ear disease, *operative treatment is urgently called for*. Judging from this case and others of a similar kind, the grave significance of this symptom in these ear cases is not yet duly recognized by some practitioners. Operation carried out early is probably more successful than in any other form of intracranial complications due to ear disease; hence the vital importance of early recognition of the condition present.

II. A case of otitic extradural abscess associated with paralysis of the sixth cranial nerve and double optic neuritis; operation and recovery.

The patient was a lad of seventeen years of age who suffered from purulent right middle-ear disease for 16 months before admission. He came to the Hospital owing to headache, diplopia, paralysis of external rectus (6th nerve), and double optic neuritis. The radical mastoid operation cleared out cholesteatomatous masses from the antrum, aditus, and the attic of the tympanum. The opening of the sigmoid groove gave exit to a collection of pus between the sigmoid part of the lateral sinus and the bone. The sinus wall was involved and covered with granulation tissue, but there being no signs of general septic infection it was not opened. There had been no pain over the mastoid area nor behind, and the temperature was normal from the time of admission. After operation the paralysis of the 6th nerve gradually, but slowly, passed off. The optic neuritis for a few weeks became more marked, with occurrence of hemorrhagic spots, and now, four months after the operation, the disks are undefined, with white spots and a tendency to atrophy, but the vision is so far unimpaired.

Remarks.—The pathological connection between the septic pachymeningitis at the sinus and the lesions causing the ocular phenomena is not very clear. The most ready explanation is that a limited basal leptomeningitis originated in the region of the sigmoid groove and extended and involved the sheath of the 6th nerve, or the more distant optic commissure, either by pressure or by producing an infective neuritis. There is also the possibility of the formation of a thrombus in the cavernous sinus, originating in the sigmoid, and by pressure involving the 6th nerve as it lies in the cavernous sinus, or, by producing stasis of the blood from the eye, causing optic neuritis. It is also to be remembered that optic neuritis seems to occur occasionally in connection with simple purulent middle-ear disease presenting no intracranial symptoms.

THE FUNCTIONAL EXAMINATION OF THE
HEARING WITH TUNING-FORKS IN MONO-
LATERAL DEAFNESS, WITH DEDUCTIONS
ON BONE CONDUCTION AND THE FUNC-
TION OF THE SOUND-CONDUCTING APPA-
RATUS.

BY PROF. BEZOLD, MUNICH.

Translated from *Zeitsch. f. Ohrenhkl.*, German Edition of these ARCHIVES,
Vol XLV., 1903.

EXAMINATIONS of the ear with tuning-forks of the continuous scale have furnished one fact which is most important and not at all appreciated, namely, that by means of this examination we are able to determine with certainty not only bilateral but monolateral deafness. In a paper on the "Determination of One-Sided Deafness with Six Additional Cases of Labyrinth Necrosis,"¹ I was able to show, from the qualitative and quantitative examination of four patients with a labyrinth defect on one side while the other side was healthy, and in three with a labyrinth defect on the one side and deaf on the other side, by means of the continuous-tone series, the sure proof that the supposed hearing of the ear without a labyrinth is nothing but the reflex of the hearing of the other healthy or partly defective ear brought about by the impossibility of excluding the healthy ear during the examination. This reflex is situated exclusively in the upper part of the tone series, and extends from the marked octave to the upper hearing limit of the normal ear. The lowest tone which is heard only for a moment by the ear without a labyrinth is situated between a' and a in the Edel-

¹These ARCHIVES, vol. xxvii., p. 158, 1898.

mann tone series. The two clamped tuning-forks of the continuous scale which were employed in these experiments have a hearing duration of 94 and 75 seconds.

As regards the hearing duration of the tones in this area of hearing for the ear without a labyrinth, the unclamped *a'* tuning-fork was perceived by only two of the four where the other ear was normal, and by not one of those who were deaf on the other side. The hearing duration for the former ears was 88 seconds; in one of the two without a labyrinth which could hear the fork the duration was 12, and in the other 8 seconds. From *a'* upwards in the tone scale the apparent hearing duration of the ear without a labyrinth rises successively and in regular progression with the increase in pitch of the tone.

Whenever one ear is normal and the other ear presents a more or less corresponding average hearing relief, we may assume that the hearing is completely lost.

Our knowledge of the functional examination of an ear without a labyrinth was completed by the examination of three cases in which the other ear possessed large hearing defects in various areas of the tone scale, and in which at every time the hearing was reduced to a minimum for the corresponding areas of the ear without a labyrinth or equalled nothing, so that it is apparent that the ear without a labyrinth has no independent hearing, and represents only a weak image of the hearing of the other ear.

Recently an additional case of labyrinth necrosis with changes in the second ear, and a series of exact examinations of one-sided deafness, have been published by Wanner.

Since we have realized the relation between the hearing of tones and the voice from the numerous examinations of deaf-mutes with hearing remnants, we are in a position to better understand the partial hearing for speech an ear without a labyrinth apparently possesses. The true tones of speech are principally situated between the 1-2 marked octaves and upwards, and it is only possible to show by the Lucæ-Dennert experiment that hearing for the voice by the ear without a labyrinth is only an apparent one.

A positive diagnosis of complete one-sided deafness could only have been made since we have become better acquainted with the examinations of hearing durations with tuning-forks. The possibility of diagnosing the onset of deafness in an ear by this means, although it has been known for six years, has never received any practical recognition.

Hinsberg gives in his article on "Labyrinth Suppurations"¹ a striking picture of the severe danger of a labyrinth suppuration secondary to middle-ear disease. Whenever the suppuration has advanced to this stage, more or less complete destruction of the function occurs in a very short time. If Hinsberg had limited himself to cases where deafness was surely present, the mortality would have been much increased.

The mortality of the labyrinth necroses, 16-20 %, which I have published, is also probably too small. The material for such statistics is naturally very defective. The functional examination is apt to be the point which most authors pass over in the description of the complications.

Hinsberg himself states: "As regards the determination of deafness, it is sufficient for me to call attention to the difficulties which have been well described by others."

It is just this difficulty which I had hoped to remove by my investigations. It is my hope that the method which I had suggested to determine one-sided deafness would become common property for all those who are active in this field.

The demonstration of one-sided deafness is nowadays not at all difficult; on the contrary, it is easy and certain. If the time for examination is brief, it is sufficient to determine the lowest tone limit. Whenever the middle tone of the scale *a'* is not perceived or only slightly so, and at the same time the lowest part of the scale, which should be examined with a few deep forks without overtones, is found wanting, then we may assume deafness; if in the case of middle-ear suppurations the hearing for some of these tuning-forks was previously good, then in case of their defect it can be assumed that the suppuration has extended to the laby-

¹These ARCHIVES, vol. xxxi., 1902.

rinth. Our diagnosis will be more reliable if we at the same time examine the hearing relief in the entire upper half of the tone series.

According to the experience of various authors with whom I agree, the danger of concussion from the chisel in recent labyrinth invasions is especially great. Operation should be all the more quickly undertaken when the hearing diminishes in the characteristic form and signifies the onset of a labyrinth involvement.

If the labyrinth suppuration has existed for a long time, the danger of using the chisel is not great.

Whenever we are able to determine complete deafness, we are furnished an index which directs our operations towards the posterior pyramidal surface, that part by which we know a labyrinth suppuration generally extends to the meninges and brain.

The cases of one-sided deafness furnish, if they are examined by this method, a valuable contribution to determine so-called bone conduction.

My standpoint in regard to the various sound-conducting theories, which I advanced fully eighteen years ago, is as follows:

I share the conviction of all physiologists and otologists that not molecular movements but mass movements of the conducting chain together with the labyrinth water column transmit the sound waves from the air. Accepting this, we cannot recognize that the nerve terminals are also attacked by molecular vibrations, which most authors assume to be present in the form of direct transmission through bone. I am moreover on the side of those physiologists who regard bone conduction as osteo-tympanic—in other words in conduction through bone the excitation of the auditory nerve takes place exclusively with the aid of the sound-conducting apparatus vibrating with the bone.

There are three processes in bone conduction :

1. The sound waves reach the surface of the bone either by air or by direct contact with the sounding body.

2. The transmission through the bone which coincides with the conducting power of the bone.

3. The transmission to the labyrinth water column either directly through the bony capsule or through the intermediary of the sound-conducting apparatus in the middle ear.

The first part of this, the conduction of sound waves to the surface of the bone by air has, in the opinion of modern theoretical investigators, produced such an erroneous impression of the entire process that they regard the sound-conducting apparatus as of secondary importance whose only function is to regulate the labyrinth pressure, and assume a direct transmission of sound waves from the air to the labyrinth.

The conducting power of sound through a bony substance is a very complete one and has long been recognized. Sound waves which are directly transmitted to the bone by a tuning-fork are conducted so rapidly and with so little loss of energy that the distance through which the sound waves have to pass in bone can be disregarded as affecting the intensity of the perceived sound. Thus, if in a one-sided completely deaf person a deep tuning-fork is applied upon the mastoid process of the affected side, the perception will be probably not much shorter than that on the side of the normal-hearing ear. The distance to the sound ear seems to make very little difference. It is a very difficult question whether this sound is directly transmitted to the labyrinth of the healthy ear, or whether it first causes the drum and ossicular chain of the healthy ear to vibrate, though this question can be at present disregarded.

I shall limit my remarks to the question whether sound waves, produced in the air and meeting the surface of the bone without being in direct contact, are perceived and with what intensity, just as is known in the case of solid sounding bodies like tuning-forks which are placed in contact with bone.

Granted that the bone possesses this power of receiving sound waves, and that the sound-conducting apparatus has only a secondary rôle, the power of transmission of the bone for sound waves must then be an unusually great one, and

this power must be present throughout the entire scale from the lowest to the highest tones. We find this point mentioned in the *Physiology* of Johannes Müller in 1840.

On page 419 it is stated: "The tone of sounding air (as for instance of a wind instrument) is excellently conducted by air and led to the ear, but is transmitted with difficulty and with a loss of intensity to solid bodies."

On page 426: "Air animals without tympanic cavities are never dependent upon the transmission of sound through the bones of the head. The transmission of air to the solid parts is too weak, but sound waves proceed with great intensity from air to water by means of a tense membrane even if the membrane is attached with the greatest part of its surface to a short solid body which alone is in contact with the water." (The plate of the stapes.) Finally, on page 455: "The conduction of air waves through the cranial bones can only be perceived if the tympanic apparatus is not present and the external auditory canal is closed. Probably in this case air waves would not be heard, or at least only very feebly."

Forty years later Hensen says in discussing bone conduction: "As bone conduction unquestionably passes for a decided part of its course through the apparatus of the tympanum to the labyrinth, it would be proper to retain the expression cranio-tympanic conduction. To what degree direct bone conduction produces a sensation of hearing is still undetermined."

After examining the four patients without a labyrinth where the other ear was normal, it has seemed to me possible to decide whether sound waves are received by the bone, and in what degree.

If one remembers that in these cases the entire drum was absent, and that the labyrinth cavity was eradicated and converted into one cavity with the tympanum and the auditory canal, we have a natural hearing tube in the base of the skull which leads very nearly to the normal-hearing labyrinth of the opposite side, these patients must be able to receive sound waves directly with the intact labyrinth, or by means of the intact sound-conducting apparatus.

We see that in these four cases where the other ear was intact the tuning-forks of the entire scale up to a' were not perceived even when the tuning-forks were brought in direct proximity to the ear without a labyrinth.

The lowest octave of 16–32 vibrations is, of course, only heard by the normal ear at a distance of a few centimetres from the meatus. This is naturally changed if we make use of a hearing tube. In this case my own ear can hear the C_1 fork (32 V.D.) with facility at more than a meter distant.

As regards the upper half of the scale, we have found a different condition in the ear without a labyrinth than in the lower half. This can be explained by the fact that the closure of the canal on the hearing side cannot be sufficiently tight in order to exclude the hearing of the sound waves of the upper tones on the part of the healthy ear. We know from daily experience the intensity with which high sounds will penetrate doors and walls. This peculiarity in the perception of high tones does not in the least decrease the value of the experiments, which show that normal hearing does not take place through direct bone conduction, but through the drum membrane and the sound-conducting chain.

We know, however, that in every case of defect or fixation of the sound-conducting apparatus there is a part in the lowest end of the tone scale which is defective for air conduction. The proof of the observation of the necessity of an intact sound-conducting apparatus for the perception of the deep tones could be opposed because pathological conditions were found to be present which were also partly located in the labyrinth.

In these four cases the condition is a perfectly definite one—namely, an ear with intact sound-conducting and nervous apparatus, which notwithstanding cannot perceive the loudest sound waves striking against the bony capsule as long as our examination is restricted to the lower half of the tone scale, which, for the above-mentioned reasons, is alone applicable in these cases.

The assumption that sound-waves are directly conducted

to the ear by bone conduction thereby loses its foundation ; there is an observation, on the other hand, which contradicts the assumption with certainty.

In order to get rid of the misleading influence of these modern speculations one can do nothing better than to return to Johannes Müller.

These observations have not only demonstrated the error of the various theories which mean no advance in our knowledge of the physiology of the sound-conducting apparatus, but they also furnish us with a positive result.

The importance of the sound-conducting apparatus for the transmission of the lower part of the scale is made clear after we know that the entire lower part of the scale, if it is transmitted by the air, is not received directly from the bone and conducted to the labyrinth. We now know with certainty that without this apparatus hearing by air conduction is impossible up to the treble octave.

If we calculate the large amplitudes and the slight force with which the long prongs of the tuning-forks vibrate, it will become evident why so enormous a levering apparatus is required to transfer the deep tones from the air to the labyrinth, which, according to Helmholtz, is represented by the shallow arches of the fibres of the drum membrane. We may regard the movements of the vibrating particles of the air as analogous with the vibrations of the prongs of the tuning-fork by which they receive their impulse.

As regards the higher tones up to the upper extremity of the scale, we find that the higher up in the scale the more easily can the footplate of the stapes vibrate directly from the sound waves, and the sound is transmitted to the labyrinth without the aid of the enormous lever apparatus.

These are fundamental facts in the correct comprehension of the sound-conducting apparatus.

The completion of these ideas is the task of the physicists

INCORRECT DEDUCTIONS FROM EXPERIMENTS WITH TUNING-FORKS ON THE FUNCTION OF THE SO-CALLED SOUND-CONDUCTING APPARATUS.

BY DR. GUSTAV ZIMMERMANN, DRESDEN.

Translated from *Zeitschr. f. Ohrenhkk.*, German Edition of these ARCHIVES,
Vol. XLV., 1903.

IN the last number of this Journal Bezold again refers to what he considers as his most valuable contribution, namely, that the ossicular chain acts as a sound-conducting apparatus for the transmission of the lower part of the tone scale. These remarks of Bezold's are again supported by the observations which he has been able to make on four patients without labyrinths. It was found that the other normal ear was not able to hear the tuning-forks of the lower scale up to a' , if the tuning-forks after the strongest impulse were brought with the extremity of their prongs in the direct neighborhood of the ear without a labyrinth.

Though these observations are correct, the deductions seem to be erroneous.

First of all, the deduction appears to me to be entirely too general that from this condition a normal ear is absolutely not capable of perceiving the strongest sound waves of the lower scale which encounter its bony capsule. This is an unpardonable generalization. Bezold has not experimented with the strongest sound waves—in fact only with the weakest—with tuning-forks which in the cases quoted are heard by the normal ear only at a distance of a few *cm* away from the meatus. If Bezold desired to experiment with

strong sound waves, he should have employed a drum or an organ pipe, or even the piano under certain conditions. Our deep tuning-forks, even on the strongest impulse, are capable of producing only a slight intensity.

A similar mistake is committed when in the case of the higher tuning-forks the positive result of the examination is referred to a self-evident and characteristic preponderance of the higher tones. It is not correct that the higher tones are of a greater intensity or are even transmitted through walls and doors. The objective intensity of a tone does not depend entirely upon the number of its vibrations. There are deep tones which pass through doors and walls, as, for instance, the tones of a deep organ pipe, and, on the other hand, there are high tones which are not able to do this, as, for instance, the tones of a high tuning-fork on slight impulse. Starting from these incorrect premises, it is evident that Bezold has not performed the experiment correctly, as he has not compared similar conditions and measured with similar means. This might have been possible if the high tuning-forks had been struck just sufficiently strongly so that the threshold value of their tones is situated at the same distance from the normal ear as that of the deep forks on maximal impulse. Bezold has compared feeble tones in the deep octaves with strong tones in the high octaves, and this want of exactness robs Bezold's comparisons of their value.

As a special argument against the recently pronounced capability of bone to receive deep sounds from the air, Bezold mentions the following: He now emphasizes that the conducting possibility of sound through bony substance is a very complete one, and hence the distance between the two labyrinths can be disregarded. With the first statement I fully agree, as I think I was the first to draw attention to bone, especially of the cochlea, as being the best sound conductor in the body. The second statement I beg to differ with. I do not think it is right to disregard the character or the amount of the bone constituting the base of the skull in these very delicate experiments, especially if the sound waves are feeble. This is made clear by the following simple

experiments. If we place a sheet of paper between a feebly-ticking watch and the ear, there is a point at which the ticking of the watch is well perceived. If instead of one sheet a large number are interposed of about the thickness of half an inch, the ticking of the watch will no longer be heard. It therefore seems probable that unequally porous bone can easily prevent a fairly normal ear from hearing sounds from the side where the labyrinth is wanting which it easily perceives on its own side. On its own side there is between the sound-transmitting air column and the perceiving fibres an unimportant layer of best conducting elastic bone.

Bezold mentions another factor which is supposed to favorably influence the perception of sound waves from the side without a labyrinth. He considers the labyrinth cavity with the tympanum and the auditory canal as representing a hearing tube situated in the base of the skull. It seems to me that this cavity cannot be considered like a hearing tube, because the one characteristic feature, namely, the uniform construction of its walls, is wanting. We can only say that, though the distance from the source of the sound to the other ear remains the same, the part passing through the bone is somewhat shortened in favor of the air part.

It seems to us that these experiments hardly suffice to contradict the new physiologic importance of bone conduction.

The positive part of Bezold's article, wherein he considers it to be possible that the deep tones only are transmitted by the ossicular chain, seems also incorrect. Bezold answers with great facility the question as to the rôle which the ossicles play in sound directly transmitted to the bone by solid bodies by stating that the transmission necessarily takes place through the chain, the osteo-tympanic path. The final decision he however leaves in the hands of the experienced physicist. Physicists, according to my experience, would not care to decide these questions, of which they know neither the character nor the importance. The work should much more properly be done by the physician, who, of course, must know the general truths of physics and make use of the assistance of a trained physicist. It is almost a duty for

those to study this topic who wish to have a personal opinion on the subject and moreover to act as teachers.

For the second question, why transmission of sound waves of the deeper scales to the cochlea takes place only by means of the ossicular chain, Bezold again has recourse to his observations with tuning-forks. The fact that the large prongs of the deep tuning-forks vibrate with less amplitude and slighter force is sufficient reason for him to generalize for the deep tones and to consider large amplitudes and slight force as usual peculiarities of deep tones, consequently a lever apparatus is necessary as a receiver and a transmitter. This one-sided view caused him to forget that bodies like tense membranes or long vibrating air columns combine great amplitude and power, which tuning-forks from their nature do not. It may be regarded as a law that deep tones are only bound to bodies of large dimensions, and consequently require a strong impulse, and are usually associated with great vital force. It is therefore not theoretically correct that a deep tone should require a particular lever apparatus by which a high tone might escape.

If we examine the practical structure of this theoretical statement of Bezold's we see that it rests on a very feeble foundation. He states with emphasis that without a sound-conducting apparatus hearing by sound conduction is not possible up to the treble octave. This, as has just been shown, is not proven by his experiments with tuning-forks on the four patients without labyrinths, and it is also incorrect. I need not mention that the strongly vibrating tones which are produced by many musical instruments are perceived, but I simply want to mention that even the tones of the deep tuning-fork are perceived in cases where there is no possibility of a sound-conducting lever apparatus. I need only recall the article of Wagner. A single positive case suffices to show the error of the deductions which Bezold has drawn from his negative examinations. I have within the last few days been able to examine two patients who had been radically operated upon where the ossicular chain was wanting and the region of the oval window was covered by a dense membrane. One of these patients was able to hear

with both ears. The other was able to hear with one ear the A tuning-fork distinctly by air conduction. The significance of the ossicular chain is not, therefore, that of a sound-conductor for the deep tones, but it acts as an accommodative apparatus which is necessary, as I have previously described.

REPORT OF THE TRANSACTIONS OF THE NEW YORK OTOLOGICAL SOCIETY.

By THOMAS J. HARRIS, M.D., SECRETARY.

MEETING OF MARCH 27, 1906. EDWARD B. DENCH, M.D., IN THE
CHAIR.

Dr. ARNOLD KNAPP presented a **temporal bone** obtained at autopsy from a case of caries of the labyrinth which had led to thrombosis of the lateral sinus, originating in the sigmoid sulcus at a point just posterior to the bulb. Dr. Knapp thought that this extension of a process from the labyrinth to the sinus was unusual.

Dr. HARRIS reported two cases of **acute purulent otitis media** complicated by **mastoiditis**, in which the results of the blood examinations were misleading. The first case was a woman of twenty-seven, with no previous history of ear trouble. An early paracentesis was performed, which relieved the pain and tenderness over the mastoid. The temperature and pulse, previously high, soon became normal. The profuse otorrhœa, however, persisted. There was at no time any sagging of the superior wall. On admission to the hospital the polynuclear count was 67 %; two weeks later, at time of discharge, it was 64 %. The patient was readmitted to the hospital ten days later for a recurrence of the mastoid symptoms, and was operated upon at once. Extensive disease of the mastoid bone was found. Three days after the operation the polynuclear count was 73 % An inflammatory leucocytosis was present, but no count was recorded.

The second case was a girl of sixteen who had suffered for a week or more from pain in the ear and mastoid. Here also paracentesis was performed and free discharge was established. No sagging of the superior wall. At the end of ten days the patient suddenly developed a high fever, 104°, became drowsy, and com-

plained of severe pain posterior to the mastoid. The discharge also abruptly ceased. The polynuclear count showed 87 %. The patient was ordered to enter the hospital the next day for operation and was instructed to take in the meanwhile a full dose of calomel with a high enema. The next morning the temperature had fallen to normal, the pain had disappeared, and the patient was feeling decidedly better; consequently no operation was performed. The otorrhœa did not recur, and the patient was discharged well in the course of a few days.

The blood findings in these two cases were seemingly at variance with the recent observations of some bacteriologists—that, whenever with an inflammatory leucocytosis the polynuclear percentage is above 80, pus is always present; and that, on the other hand, it may be excluded when the count is below 70 %.

Discussion: Dr. DIXON, from a study recently made at the New York Eye and Ear Infirmary, was inclined to believe that not much weight could be placed upon the leucocyte count and the polynuclear percentage in simple acute suppurative otitis, with or without mastoiditis. It was only when epidural abscess, sinus thrombosis, or intracranial complications were present, that such counts were of much value. Above all, in his judgment, it was of prime importance, in order to draw proper conclusions, to know in advance the normal polynuclear count of the patient.

Dr. HASKIN, who in consultation had seen the second case reported by Dr. Harris, referred to the surprisingly normal appearance of the drum membrane as seen after the cessation of the profuse discharge and mastoid tenderness.

Dr. PHILLIPS referred to a child of nine months, seen in consultation, where a high fever was present, with severe pain in ear, with bulging membrane. Here the polynuclear percentage was 85, and the leucocytosis 33,000. This led to a suspicion that the sinus might be involved and operation upon the mastoid was considered. After a paracentesis, with a thorough calomel purge, however, the temperature soon became normal and caused the disappearance of all the symptoms.

Dr. GRUENING felt that too much weight is laid on bacteriological and pathological findings, and believes that the results of clinical examination should alone determine the question of operation.

Dr. WHITING reported a case of **thrombosis** of the **right external jugular vein** following a sinus thrombosis of the internal

jugular vein of the opposite side. The patient presented a characteristic picture of sinus thrombosis, including Griesinger's symptom, and what he has been wont to observe in many of his lateral-sinus cases, a characteristic position of the head. At the time of operation the thrombus was found extending to the bulb. The jugular vein was resected. One week later symptoms of toxæmia developed, and a swelling was noted upon the opposite side of the neck from which pus was withdrawn by the aspirating needle under local anæsthesia. The infection was pneumococcus. A clot over six inches long was removed, the centre of which for about an inch was purulent and broken down.

In reply to a question by Dr. GRUENING, Dr. WHITING stated that the position of the head to which he referred was a twisting around and bending toward the shoulder of the opposite side.

Dr. GRUENING was inclined to believe that this position and all other special symptoms, such as Griesinger's, are not characteristic of sinus thrombosis. Such a position of the head is constantly met with in Bezold's abscess of the sterno-cleido-mastoid muscle.

Dr. HASKIN reported a case of supposed **cyst** of the **concha**. A careful dissection showed that the swelling was in effect a hematoma of the cartilage. The cause could not be determined. No history of a traumatism could be elicited. The patient, however, was an alcoholic. Prompt recovery without deformity.

Dr. GRUENING reported a case of **lateral sinus thrombosis** in a boy of twelve. Temperature on admission to the hospital was 104° , and showed the characteristic zigzag curve. Vomiting was present. There was a history of earache two weeks before. A paracentesis had given temporary relief. Mastoid tenderness was elicited; blood count, 11,000; polynuclear count, 82%. Blood culture showed presence of streptococcus in the blood, 245 colonies as the ccm. Three days after the operation the blood was sterile. A mastoid operation was performed and revealed a comparatively healthy bone, with the exception of two cells at the tip, which were diseased. The sinus was opened and a free flow of blood was found. The next day the temperature rose to 105° . The wound was reopened and a clot was discovered. Both the jugular and facial veins were tied off and the clot was removed. The third day at the time of dressing pus was found below. The case is progressing satisfactorily. Dr. Gruening commented upon the absence of pronounced changes within the mastoid bone, and

also that even with profound blood changes favorable results may be secured by prompt operation. It is interesting to note that the mother of this child, a Hebrew, recently arrived from Russia, has since been operated upon for a thrombosis of the lateral sinus.

Discussion.—Dr. HASKIN referred to a child recently under his care, having a temperature of 104° with a pulse of 70, complaining of pain in and behind the ear. The drum membrane was slightly reddened and there was some torticollis. There was also persistent cough. Repeated examinations of the chest were negative, as well as daily blood examinations. The temperature showed a zigzag rise and fall of from 104° to 99° . On the tenth day the pain disappeared in the ear and mastoid, and at the end of two weeks a positive diagnosis of typhoid fever was made.

Dr. GRUENING, in reply to a question by Dr. KENEFICK, stated that it was his practice at present to tie the jugular vein as a routine measure, before removal of a clot from the sinus.

Dr. GRUENING reported a case of **erysipelas** in connection with Hodgkin's disease. The erysipelas extended into the ear and an acute otitis followed, with profuse otorrhœa. The erysipelas subsided but the otorrhœa persisted, as well as a swelling of the glands in and about the mastoid process. An operation upon the mastoid was finally performed, which revealed Bezold's perforation. Here the swelling of the glands, in connection with Hodgkin's disease, had concealed the perforating mastoiditis.

Dr. WHITING reported a severe case of erysipelas which on the third day developed otorrhœa. A mastoid operation was performed and revealed extensive involvement of the bone. Recovery.

Dr. GRUENING reported a severe case of **mastoiditis** where an unusually large cell in the zygoma cell was found at the time of the operation. The patient suffered from pneumonia and double mastoiditis. At the end of the week the temperature, which had been exceedingly high, fell to normal, and a swelling of the face on the left side developed. Operation upon the mastoid was then performed and showed a zygomatic cell large enough to admit tip of the middle finger. The probe passed to the distance of two inches into the body of the zygoma.

The CHAIRMAN stated that he had met with a similar condition in a case under his care.

Dr. PHILLIPS reported a case of **typhoid fever simulating**

meningitis which had occurred in the practice of his associate, Dr. Thomson. A girl of fifteen was operated upon for mastoiditis. Complete recovery did not take place. Several weeks later she was seized with violent pain in the head and high fever. Meningitis or brain abscess was suspected and exploratory operation, including free puncture of the brain, was performed. Typhoid fever developed three days later. Recovery.

Dr. BERENS reported a case of **herpes zoster** of the **fauces**, in connection with an acute catarrhal otitis, in a boy of 11. Six weeks before the boy was seen he had suffered from a catarrhal otitis of the right ear. Paracentesis was performed and recovery followed. Five days later a relapse occurred. There was pain in the opposite ear, and the membrane ruptured without paracentesis. This was followed by mastoid tenderness. The patient, however, was somewhat neurotic and complained of pain all over the head. The temperature rose to 104° . A few pneumococci were found in the discharge. After the lapse of a few days a herpetic eruption occurred on the fauces, and a diagnosis of herpes zoster was made. With the subsidence of the eruption the discharge from the ear also subsided. The patient is now nearly well.

Discussion.—Dr. GRUENING referred to five cases of herpes zoster which he had seen in connection with mastoiditis, all resulting fatally. He accordingly regarded such a symptom as a grave one. In all probability there was an involvement of the Gasserian ganglion.

Dr. WHITING referred to Councilmann's observations on herpes with brain affections.

REPORT OF THE TRANSACTIONS OF THE SECTION ON OTOTOLOGY, NEW YORK ACADEMY OF MEDICINE.

STATED MEETING, FEBRUARY 1, 1906. DR. EMIL GRUENING IN THE CHAIR.

Papers.

Intracranial lesions of otitic origin. By M. ALLEN STARR, M.D.

Dr. STARR considered the following topics : (1) The possible cerebral complications of otitis media ; (2) the symptoms which aid us in their diagnosis ; (3) the proper methods of surgical treatment ; and (4) the results of surgical operations for these complications.

1. In addition to the cerebral complications there is acute encephalitis, occurring at any age, frequently following otitis media. It consists of an area of hemorrhagic softening either in the surface of the brain or beneath the cortex. It is an acute inflammation with congestion and minute hemorrhages, and results in a destruction of the brain tissue, and as a result a sclerotic patch of greater or less extent is produced. It is not, however, fatal. The symptoms are fatal. The symptoms are similar to those occurring in abscess, but there is no optic neuritis, no irregularity of the pupils, no vertigo, and very little headache.

2. After enumerating the usual symptoms of brain abscess, Dr. Starr spoke of two recently discussed methods of investigation, namely, the examination of the cerebro-spinal fluid obtained by lumbar puncture, and the examination of the blood. There is an increase of the leucocytes in the cerebro-spinal fluid in all forms of meningitis. This is not the case in abscess, and hence furnishes a differential point. The presence of bacteria in the

lumbar fluid is of course characteristic for meningitis. The fluid changes in meningitis or brain abscess, like all inflammatory processes, show a leucocytosis, the count rising to 20,000 or even 35,000. Dr. Starr thinks that it can be safely stated that there is a more rapid rise in the number of leucocytes and a higher leucocyte count in meningitis than in brain abscess. A rapid rise of the ratio of polymorpho-nuclear leucocytes occurs in all cases of acute inflammatory processes and therefore leads us to suspect a cerebral complication, especially if the ratio shows changes of from 65 to 70 per cent., up to 75, 80, or 85 per cent. An examination of the blood seems to aid us in determining the presence of a cerebral complication and defining its exact nature.

3. Dr. Starr believes that the operation for cerebral abscess should be conducted by a general surgeon who is skilled in cerebral surgery. The procedure recommended consists in making a large exposure of the brain by means of an osteoplastic flap, exposing an area of three to four inches. The bone flap is best made by means of an electric borer or a rotary saw. The evacuation of an abscess is facilitated by turning the patient over so that the opening of the abscess is at the most dependent part. Deep incisions into the brain are justified. The finger should never be introduced. If a deep abscess is found it should be emptied by gravitation, and decalcined bone or rubber tissue be inserted. If a diffuse encephalitis is found the region may be left alone, or the congested and degenerated area may be cut out. Hemorrhage can be arrested by tampons of plain sterile gauze. During the entire operation very hot sterile water should be run constantly over the brain, as practised by Horsley. The bone flap is then replaced and an opening left at the inferior angle for the passage of the drain. Dr. Starr advocates this method because he has observed many abscesses which were imperfectly evacuated by too small openings and subsequently fatal meningitis resulted.

4. Dr. Starr has collected from the literature of the last six years reports of 54 temporal, 25 cerebellar, and 2 occipital abscesses — a total of 81 — secondary to otitis, where operation had been performed. In 6 cases the abscess was not found at operation but at autopsy; 42 cases recovered after operation; death occurred in 89. The cerebral cases were particularly unfavorable — a mortality of 16 in 25.

Finally, the speaker urged early operation. Incisions into the

brain should not be small nor badly located. Drainage must be perfect, and thus meningitis may be avoided. The fact was commented upon that frequently cerebellar abscesses do not give characteristic symptoms. Dr. Starr mentioned the cerebellar seizure so named by Dana. It consists of sudden unexpected attacks of extreme vertigo, roaring in the head, relaxation of the limbs, and falling to the ground in a semi-conscious state. These symptoms especially occur with tumors lying in the angle between cerebellum, pons, and medulla—a place which is also a frequent site of abscess.

Otitic disease in its relation to intracranial lesions.—By CLARENCE JOHN BLAKE, M.D., of Boston.

Discussion.

Dr. B. SACHS said that neurologists were always glad when the otologist had preceded them and had determined the otitic origin of a case, for with that the real difficulty in diagnosing cerebral abscess was done away with. An important point to which he wished to call attention was, that in spite of the presence of marked cerebral symptoms the condition need not be a sinus thrombosis, or a brain abscess, but simply an encephalitis. Before the more recent picture of encephalitis had been described, he had been in the habit of speaking of such cases as cases of meningeal irritation. Coincident with the establishment of an encephalitis there is no doubt a meningeal involvement, and the proper surgical treatment of such cases would depend largely upon whether it was an acute hemorrhagic or an acute suppurative condition. All acute hemorrhagic conditions tend to take care of themselves; he would in suppurative processes call for surgical interference. He would hesitate to advise operation if all the conditions pointed to hemorrhagic encephalitis. Regarding the diagnosis of abscess, there were a number of points to be considered. In the diagnosis of temporo-sphenoidal abscess, which is generally due to direct extension of the acute infection, the point which had struck him most was the peculiar character of the aphasia. It is not the kind that we would expect. A purely sensory aphasia is rare. Motor aphasia is much more common; so also are various forms of paraphasia, and conduction aphasia. He could not remember having seen a pure sensory aphasia in connection with otitic affection. Regarding cerebellar abscess, he was glad that Dr. Starr had called attention to Dana's symptom—the value

of the cerebellar syndrome as pointing to cerebellar involvement. The cerebellar seizure is a distinct grouping of symptoms indicating involvement of the cerebellum. Another symptom which helps every now and then to locate the abscess of the cerebellum is almost equally important, *i. e.*, the early involvement of the facial nerve—not in the form of paralysis but of an electrical reaction of degeneration of the facial nerve. It may become involved during the operation, but he told of a case where he had examined the nerve immediately after operation and found it act well, and then with the onset of other symptoms the nerve showed reaction of degeneration which had developed subsequently to the operation. He thought that this development of an early reaction of degeneration in the facial nerve indicates the probability of abscess in one of the lateral lobes of the cerebellum rather than of a sphenoidal abscess. In many cases it was difficult to decide whether the symptoms are due to labyrinthine disease or to cerebellar disease—the labyrinthine disturbance being so great that it was difficult to distinguish between the two. He wished particularly to express his appreciation of Dr. Starr's courage and boldness in attacking the condition of cranial surgery. It might be claimed that neurologists had no right to speak on surgical matters, but he thought they had as much right to do this as musical critics have to speak of musical performances, and that neurologists claimed to have some knowledge of how such operations should properly be done. Some months earlier he had spoken on this subject before a Boston audience, and had taken all the surgeons to task for their general neglect of cranial and intracranial surgery. Cranial surgery is not in a satisfactory condition to-day. When one considers the great care with which abdominal operations have been developed, the care in retaining the natural heat of the organs, and in avoiding unnecessary loss of blood, and the rapidity with which such operations are performed, as contrasted with the attention given to cranial and brain surgery, we find that the brain is not considered to be the organ of greater dignity. The matter of retaining the natural heat of the brain, to which Dr. Starr had referred, is of the greatest importance, and Dr. Sachs said that he believed Horsley's success had been due, in a large degree, to his attention to this point, yet it seems difficult to impress the value of this upon many surgeons of the day. He endorsed very strongly what Dr. Starr had said in regard to avoiding hemorrhages, and

to the character of the drainage. In concluding, he said that, whether the abscess was a direct or an indirect one, he could not believe that any brain abscess should be drained through the ear cavity. The brain was too delicate an organ to be approached in the dark, and he would plead for the largest possible exposure in operations on the brain, and for the proper drainage of the abscess.

Dr. GEORGE W. JACOBY said that notwithstanding all that had been written concerning the diagnosis of the different complications following otitic diseases, we are only the more convinced that the differential diagnosis between epidural and brain abscess and the various forms of meningitis is difficult, and that complications of unusual nature make it at times next to impossible. He would like to call attention to a subject which had not to-night received the attention he had expected it would, because it was of importance to neurologists as well as to otologists, and that was serous meningitis. The serous meningitis of Quinke, as a complication of acute otitis, was most important. The course of events here was somewhat as follows: During the existence of an acute otitis there occurs a sudden onset of symptoms of brain pressure accompanied by a reduction of vision, optic neuritis, cerebellar symptoms, and other symptoms of posterior fossa pressure. The diagnosis is made of suppurative meningitis or brain abscess, the brain is opened or a puncture is made, and nothing is found. The next order is that the patient improves and gets well. Quinke has described this form of meningitis as a serous meningitis, in which it seems that any opening of the arachnoid space may be followed by a cure. These cases are certainly important from a diagnostic point of view. The question arises: Can a diagnosis be made before the space is opened, or is the diagnosis dependent upon the result which follows such operations? The speaker thought it could. In these cases the pressure is most pronounced in the posterior fossa; you get cerebellar and spinal symptoms, ataxia, paraparesis, and cranial nerve paralyses early in the course of the disease. Another aid in the diagnosis of these cases is that derived from lumbar puncture. Dr. Starr had referred to the results of this operation in other affections. Here you evacuate a clear fluid under a pressure which you do not obtain in an abscess or purulent meningitis, a very extraordinarily high pressure; so that these two symptoms together—the early presence of posterior

fossa symptoms and the lumbar evacuation of clear fluid under enormous pressure—are sufficient to create the suspicion of a serous meningitis. At any rate, in all doubtful cases we should at least do that much—perform a lumbar puncture followed by more or less prolonged drainage. If we obtain no fluid by means of lumbar puncture, the ventricles should be tapped and pressure relieved in that way. As to the diagnostic value, in a general way, of lumbar puncture, he agreed with what Dr. Starr had said—that is, that in brain abscess we do get a perfectly clear fluid. It has been assumed by Brieger that we might get a turbid fluid if a posterior communication existed between the abscess and the lateral ventricles, but he knew of no such case in literature nor had he ever seen one. In purulent meningitis you get a turbid fluid full of cells and micro-organisms. Inasmuch as the communication between the brain and spinal cord may be closed, only a positive result is of value. The results here mentioned as obtainable in abscess, purulent meningitis, and serous meningitis are the three diagnostic features which give value. He felt that Dr. Starr was perfectly correct in what he had said of blood examination. The increase of polymorpho-nuclear cells was very important. The leucocytosis was of little value. He had seen a case recently, where the polynuclear count sprang up from 65 to 80%, and on this a diagnosis, which had been uncertain, was made and operation followed. An abscess was found and evacuated. He agreed with what Dr. Starr and Dr. Sachs had said on the subject of free drainage, and believed that this could only be accomplished through a large opening.

Dr. HERMAN KNAPP said that brain abscesses, generally speaking, are found in three locations, originating also in three adjacent regions. (1) Those in the *frontal lobes* originate in the accessory sinuses of the nose—the frontal sinus, the ethmoidal cells, and the upper nasal passages, where they perforate the thin cribriform bone. They betray their presence only by insignificant and uncertain symptoms, which are more mental than organic, chiefly fretfulness. (2) The abscesses in the middle cranial cavity originate in the *tegmina tympani et atri*. They lodge in the temporo-sphenoidal lobe in greater numbers than all others together. (3) Those in the posterior fossa are mostly caused by purulent sinus thrombosis and epidural abscess. Besides these, there is a smaller number which originate in the pyramid of the petrous, penetrating through the vestibular windows, also

through the aqueducts, especially the cochlea, rarely through the inner meatus. The osseous labyrinth is not infrequently the seat of great ravages by purulent inflammation, especially in children, so that the organs of hearing and equilibrium, harder than the bone of the mastoid, are exfoliated, and the hearing in one ear—not rarely in both—is abolished. The labyrinthine origin of the most severe complications has not yet received the surgeon's care so much as other aural complications of intracranial disease. They cause death by purulent meningitis, cerebellar abscess, sinus thrombosis, perforation of the outer part of the mastoid, and deep-seated abscesses, which may penetrate into the mediastinum. Both the meningitis and the propagation into the deeper parts can be cured when the difficulty is promptly diagnosticated and treated. The treatment by lumbar puncture is not only a help for diagnosis but is an efficient remedy. Of late, in such cases, an osteo-plastic craniotomy has been added, and if epidural abscess (pachymeningitis externa) was found, the dura mater was incised in the whole breadth of the diseased dura; but puncturing should be avoided, as it is apt to inoculate the deeper part—though in some cases it seems to have had a beneficial effect.

In concluding his remarks, Dr. Knapp passed around a rare specimen of total rottenness of the petrous from the external surface of the mastoid to the anterior third of the petrous. It was honeycombed by purulent destruction. He had showed this specimen before, but brought it again, as it was a highly instructive demonstration of the fact that even such apparently fatal cases can be cured. Accident had brought to him a patient with an exactly similar condition. Besides these, he had found in the dissecting rooms of the Berlin University a specimen of a skull in which all the parts had been removed which were rotten in the Vienna specimen just shown, excepting the canals—the facial and the three semicircular canals. He thought that this would be the method of treating such a patient, as the morbid specimen showed, and a little later had an opportunity of treating such a patient with exactly this condition, who had suffered from purulent otitis for several years. He operated accordingly, removing the soft rotten tissue with a curette, and found the canals to be intact and ivory-like, withstanding the cleansing of them. He then showed the specimen he had acquired in Berlin, which illustrated the operation. The patient recovered

without any unpleasant symptoms and was presented before several societies, among them the American Otolological Society, in whose *Transactions* the case was published.

In concluding, Dr. Knapp said that aural complications of brain disease form an important branch of the work of the physician and the surgeon. The main object is an early diagnosis and the prevention of the brain complications by treating the ear, using lumbar puncture when meningitis is threatened, and when the graver stages are reached to seek its location, when operation will save many a life.

Dr. DENCH said he had operated on one case of encephalitis of septic origin, and that the operation had been followed by recovery. He considered that the blood count was a diagnostic measure of great value, especially in the diagnosis of brain abscess, the differential count being of much greater importance than the actual degree of leucocytosis present. In a case where brain abscess is suspected, a large increase in the number of polymorpho-nuclear cells would be strongly confirmatory of brain abscess.

In regard to the case observed by himself and to which Dr. Starr had referred, the two important diagnostic points were the temperature and the differential blood count. In referring to this case, Dr. Starr had made a slight error. The polymorpho-nuclear percentage never rose above 79. In this case the abscess was evacuated late, and the patient died twenty-four hours afterwards from meningitis, which was undoubtedly present when the operation was performed.

Dr. Dench did not agree with Dr. Starr regarding the presence of leucocytosis in cases of sinus thrombosis, with extension of the thrombus into the internal jugular vein. In none of his own cases of sinus thrombosis had he seen any marked increase in the leucocyte count. A high percentage of polymorpho-nuclear cells was frequently present in this condition.

With reference to what Dr. Starr had said about operations on brain abscess, he, personally, believed that the otologist was the man to perform these operations in all cases of otitic origin. If the otologist did not know how to do these operations, he should at once learn.

Regarding whether the abscess should be evacuated by the tympanic route or by the route above the zygoma, Dr. Dench was inclined to agree with Dr. Starr, that in all cases where the operation was exploratory, the route above the

zygoma should be chosen. In cases where, at the time of operation, there was caries of the tympanic roof, and upon removal of the carious bone discolored dura was found, with possibly a sinus leading directly into the cavity of the brain abscess, then, of course, the tympanic route should be the one chosen for evacuation. In cases where a brain abscess was suspected, and simply an exploratory operation was to be performed, such exploration should always be made above the zygoma, for the reason that, if the opening were made through the *tegmen tympani*, the operator would be entering the cranial cavity through a septic field. It was important, in all of these cases, to make the exploration as thoroughly aseptic as possible.

The speaker did not agree with Dr. Starr as to the feasibility of turning down a large osteo-cutaneous flap in exploring for an otitic brain abscess. If an abscess were found under these conditions an infection of the bony flap would almost certainly take place, and would probably be followed by fatal meningitis. It was much better, in these cases, to make a large opening in the skull by means of the chisel and rongeur, to drain the abscess thoroughly, and if the large defect of bone caused any difficulty later, to insert a plate of sterile celluloid or some similar substance.

Dr. Blake's remarks about the tympanic cavity were well-timed. No one who has operated on many mastoid cases can fail to see the intimate relation which the pneumatic spaces of the mastoid bear both to the middle cranial fossa and to the lateral sinus. The distribution of many of the smaller pneumatic spaces is irregular, and will vary in each individual case. In other words, with an acute inflammation of the middle ear, the surgeon is never certain, owing to the anatomical differences which may exist, exactly what the danger is of intracranial infection in any particular case. He must always bear the danger in mind, however.

Dr. Dench also agreed with Dr. Blake as to the relative frequency of the micro-organisms present in acute inflammation,—that is, pneumococcus first, then the streptococcus, then mixed infection, and then the staphylococcus.

Dr. Blake's remark, that epidural abscess was simply an act on the part of Nature to prevent a general meningitis by walling off the septic area, was a view which the speaker had long maintained. Owing to the fact that an epidural abscess is com-

pletely walled off from the general cranial cavity, the mortality in these cases is but slight. Dr. Dench had operated on thirty-eight cases of this kind, with only two deaths; the fatal termination in these two cases was due to some cause independent of the abscess.

With reference to sinus thrombosis, of which Dr. Blake had spoken, Dr. Dench mentioned the fact that although usually the sinus wall was thickened, as the result of infection, in some of the cases, and especially in the very early stages, the sinus wall was sometimes very thin—in fact, ulcerated. In a case of this character operated on recently, a free incision of the sinus and removal of a small clot—resulted in the complete recovery of the patient.

As to interference with the internal jugular vein, the speaker thought in every case where the vein was tied, it should be excised from the point of ligature in the neck to the base of the skull.

Regarding the mortality of sinus thrombosis, Dr. Dench had operated on 41 cases, of which he had records, and of these, 33 had been cured and 8 had died. In 14 cases the jugular was excised, and of these, 10 were cured and 4 died. In most of the cases which died subsequent to jugular excision, pneumonia was the cause of death, the disease having been present prior to the excision of the internal jugular vein.

Dr. McKERNON remarked that there was little to add to what had already been said on this subject, but that there was one point which he had hoped Dr. Starr would mention, namely, the possibility of gaining some knowledge by means of the X-ray. This has been used, and he believed successfully, in the clinics at Bordeaux and Vienna. He himself had tried it in two cases, one of which had given negative and the other positive results. In the latter case the abscess was found in exactly the spot indicated by the ray. In future this may prove to be a valued method of making a diagnosis. Dr. Starr had spoken of the contra-indication for the use of iodoform drain in a brain abscess. The speaker did not think any one had had better success in curing cases of brain abscess than Macewen, and while he does not use iodoform pure and simple he uses it with an equal part of boric acid, packed in very loosely. He does not allow the withdrawal of the gauze until the abscess pushes it out. It is placed in the bottom of the cavity and comes out by the

pressure from the brain. This method had been used by himself several times, and with uniformly good results.

Dr. McKernon said that another point which he was glad to hear Dr. Starr mention was the irrigation of the cavity with hot saline solutions. He himself had advocated this in three cases of brain abscess eight or nine years ago, and had been severely criticised for attempting to irrigate at all. It was contended then that the abscess should simply be evacuated and mopped out with gauze. The irrigation certainly washes away necrotic material, and if there is an encapsulated abscess, it makes it much cleaner than the sterile gauze. Another point on which he wished to add his testimony was in favor of the polymorphonuclear count. It had helped him much in cases of brain abscess, epidural abscess, and sinus thrombosis. It is a most valuable aid in the diagnosis of these cases. He was also in accord with having a large opening in operations for brain abscess and not draining through the tympanum. In every case of intracranial complication the time element is a very important feature, and enters largely into the successful outcome of the case. The fewer minutes taken, the greater the probability of recovery.

Dr. BERENS said that he agreed with Dr. Starr in general, but while he agreed that special skill and wide experience were necessary for successful operative work upon the brain, he certainly felt that the modern operating aurist was at least as well qualified as the average general surgeon. Perhaps the future will develop specialists on brain surgery, but he thought that they would develop from among the aurists.

Dr. SPRAGUE told of two cases of suppurative meningitis following otitis, showing the value of the blood-count. In one of these before the mastoid operation the blood-count was 17,000 and the polynuclear count 94 per cent. The patient was expected to die, but after the operation everything went well for six weeks, when the patient was suddenly taken with nausea and vomiting, the temperature rose rapidly, and in two or three days death ensued from meningitis. Before death another blood-count was taken showing 32,600, and the polynuclear count was 87 per cent. At the autopsy there were several scattered collections of purulent material on the brain surface and several areas of encephalitis. The other case showed a similar condition at the autopsy, but all through the illness the blood-count did not go above 11,000, with a

polynuclear count of about 70 per cent., and after the meningeal symptoms were pronounced the white count was only 7,500. This was surprising and must be unusual. In a case of brain abscess which had been operated upon, after the operation the white count was 10,000. The count was made every four or five days and suddenly, one day, was discovered to be 30,000. Then the brain was separated where the original opening had been made and a half ounce of pus escaped. This showed the value of the blood-count in an intracranial collection of pus. As to who should do these operations, he thought that if they were to be done by the general surgeon he should know more about ear anatomy and disease conditions; and if by the aural surgeon, he should know more about brain surgery. It was very necessary to remove the focus of infection, and the tympanum, antrum, and the attic are the points where the infection starts, so they should be thoroughly cleaned in order to prevent re-infection of the brain after operation, and most general surgeons are not well informed in regard to this region. He himself had only seven brain abscess operations to his credit. Three of these died and four lived. Of those who lived, two were operated through the roof of the mastoid, with a counter-opening through the parietal wall of the middle cerebral fossa, and in the other cases the point of attack was anteriorly through the parietal wall, there being no communication directly through the tympano-mastoid roof. All of these cases were irrigated with saline solutions and did well. The fourth case was a cerebellar abscess case and that also did well. The diagnosis is one of great difficulty, and there is always more or less confusion in the symptoms of brain abscess, as there is also the possibility of brain abscess and meningitis being combined.

Dr. WILLIAM M. LESZYNSKY said that, with the exception of the assistance derived from the examination of the cerebro-spinal fluid, the difficulty of making a diagnosis in individual cases of otitic brain abscess seemed to be as great as it was some years ago. He related the history of a case operated upon for left mastoid disease, in which indications of cerebral involvement developed subsequently. There were headache, fever, vomiting, and sensory and jargon aphasia. Lumbar puncture was made. The fluid escaped under high pressure, and its examination proved negative. On account of the complete auditory aphasia, it was thought probable that an abscess involved the temporal convolu-

tions, although in left temporo-sphenoidal abscess the so-called optical aphasia is the form usually present.

Shortly after the lumbar puncture, the patient began to improve, and within forty-eight hours the aphasia had entirely disappeared. When a patient with symptoms of abscess of the brain dies from sudden respiratory failure, the probabilities are that a cerebellar abscess was present. In one of his cases, just as the cerebellar abscess was opened, the patient ceased to breathe, although the pulse continued for several minutes. Many similar cases are on record. He thought it would be impossible to make a diagnosis of cerebellar abscess based upon the electrical reaction of the facial nerve, for in every case that he had seen in which there was a facial paralysis it had been of the peripheral type and usually accompanied by the reaction of degeneration. In regard to the cerebellar syndrome referred to, he had seen many cases of cerebellar abscess of otitic origin, but had never observed this syndrome, which was more likely to occur in cerebellar tumor. He was interested in what Dr. Jacoby had said, for he had seen a number of cases in which the cerebral symptoms had entirely disappeared after lumbar puncture or free saline catharsis, and he had therefore attributed the manifestations to serous meningitis.

Dr. GRUENING said that the method followed by otologists in finding and treating abscess of the brain had not been correctly stated in this discussion. Bergman and Körner have shown that the otitic brain abscess lies very near the diseased bone. Most frequently the antral and tympanic roofs are involved. It is but natural that these structures should be removed together with as much of the temporal bone as may be necessary for unimpeded manipulation and free drainage. The advantage of this method is that drainage is aided by gravity. The application of mensuration in locating otitic brain abscess works well in theory but not in practice. It also seemed to him pertinent to mention here the name of Zaufal, the otologist of Prague, who has taught us to deal successfully with one of the most serious of intracranial lesions. He was the first to remove the clot from the infected lateral sinus, and to tie the jugular vein, thus marking an era in otology.

Dr. STARR, in closing the discussion upon his paper, expressed his appreciation of the manner in which it had been received. The statements had been made without the slightest personal reference to any one whom he had seen operate, and incidentally he would say that he had probably witnessed as many brain opera-

tions by different surgeons as any one in the room, if not in America. The points he had wished to inculcate by his criticism of brain-abscess operations by otologists, he was perfectly willing to reiterate. One of the speakers had remarked that he had apparently arraigned the whole surgical profession in regard to brain surgery. He considered it an unfortunate fact that less attention had been paid to brain surgery in this country than it merited. There are very few men in this country who have given special attention to this important branch, excepting Keen, McBurney, Hartley, Cushing, and McCook, and the advances along this line of work have been made largely by Kocher, von Bergman, Horsley, and Macewen. Horsley for three years did very little but brain surgery. Macewen gave great attention to it for a number of years, and is still giving attention to this branch. Horsley does most of the cerebral surgery in England and is busy all the time. There were very few men who had taken up this branch of surgery so carefully and accurately in this country. Dr. Sachs had agreed with him that our surgeons have neglected this field to a large extent. There are competent men in this country who have done excellent work, and he had called attention to the methods which should be pursued, as he believed that great progress could be made and better results attained by the adoption of these methods than by the present methods employed. He did not wish to be a harsh critic, but he hoped that his remarks would stimulate work, which would result in a better percentage of recovery in this most important class of cases. In regard to such operations as Dr. Dench had described as exploratory, while he agreed that many operations are exploratory, he did not think that this affected the statement that they should be large in their field. Explore if necessary, but not through a little opening, or with a probe. You are going to set free a mass of pus in a cavity and it will permeate the meninges and be a prelude to death. If one is going to explore, it should be done so that if anything is found the proper procedure can be followed. It is amazing how safe such operations are when done properly, and they obviate the dangers of cerebral hernia in brain surgery. Dr. Starr said that he had never seen such a hernia in any case where a large flap had been made in the bone so that it could be replaced properly, keeping the brain in place. Where the opening is small there is liable to be a hernia, and as a rule a cerebral

hernia is a septic process. If there is a large opening and proper drainage, there will be no such condition. The danger of irrigating is only a danger when the opening is small and there is no exit for the water pumped in. The question of aphasia brought up by Dr. Sachs he had not alluded to, as he had gone into this matter freely in a paper before the Otological Society some time ago, which was subsequently published. In this paper he described the so-called optical aphasia and spoke of the fact that Freund and Pick had called attention to the peculiarities due to temporal lesions. He might have dilated a little more upon the point that in a brain abscess we have to deal with a lesion of the tract which passes between two centres, visual memory and auditory memory centres, in which numbers of things seen and heard are stored up. When an impression gets to either of these centres the object is recognized, but when the tract between these centres is broken the association between the visual and the auditory memory is broken, and then the appearance of an object does not bring to mind its name, and naming an object does not call up the memory of its appearance, hence the patient cannot name objects shown him, or describe objects which he hears named. Side by side with these association tracts lies the visual tract, and a lesion of this will cause hemianopsia with the optical aphasia.

In regard to the question of radiographs, brought up by Dr. McKernon, Dr. Starr said that he had only had two radiographs taken in brain abscess, and neither of these showed anything. He had a large number of cases of brain tumor on record where radiographs had been taken, but had received no help from the pictures given by the X-ray. He was aware that some had had reported different results, but he questioned whether the consistency of the softened mass of the abscess or tumor would differ so much from the brain tissue around it as to give a picture which would be reliable. Of course it would be a great aid if we could be sure in that matter.

Dr. BLAKE in closing said that, in view of the remark of Dr. Gruening, he wished to emphasize the undesirability of draining a brain abscess through a septic cavity, and the importance of a thorough cleansing of all the parts adjacent to an infected site; the opening of the cranial cavity being a distinct operative procedure. We certainly do get a large number of extradural abscesses of small calibre both posterior to the mastoid and

above the tympanum, and only an otologist is able to appreciate the frequency with which these occur. Ordinarily he packed these extradural abscesses, but after thorough cleansing he had succeeded in getting them healed, coincidentally with the mastoid wound, by first intention. He was very glad to hear the question of the blood-count and lumbar puncture brought out, for in recent services he had made this a part of the regular procedure in all cases of suspected intracranial complication of otitic disease.

REGULAR MEETING, MARCH 9, 1906. DR. GRUENING IN THE CHAIR.

Presentation of Instruments.

Eustachian sounds. By SIDNEY YANKAUER, M.D.

The sounds are made of catgut surrounded by a resinous substance. They are soft, smooth, and very flexible, and can be sterilized by dipping them in boiling water. In shape they resemble the urethral sound rather than the bulb-pointed bougie—*i.e.*, they are of uniform diameter, tapering at the tip. They are graduated in size. A scale is attached to each sound so that the distance to which it is introduced can be measured. On account of the softness, smoothness, and flexibility of the instruments they can be used very freely without producing irritation of the tube, and hence rapid dilatation of obstinate strictures becomes possible. They are made by Messrs. Tiemann & Co.

Papers.

Infective sinus thrombosis : varieties of systemic infection and treatment. By ARNOLD KNAPP, M.D. (Printed in full in this number.)

Discussion.

Dr. KIPP said that he had nothing to add to Dr. Knapp's excellent presentation of this subject, but regretted that he had failed to refer to the operations recently devised by Piffi, Grunert, Voss, and Iwanoff for the exposure of the bulb of the jugular vein. Of these, the Grunert operation is undoubtedly the most thorough, as by it the sigmoid sinus, the jugular bulb, and the internal jugular vein are converted into a continuous open gutter; but the danger of injuring the facial nerve and of invading the vertebral artery if the transverse process of the atlas has to be resected in order to reach the bulb will doubtless prevent many surgeons from resorting to this method, when the much simpler and much less dangerous operation described by Voss

and Iwanoff will enable us to reach the bulb after complete removal of the tip of the mastoid. Iwanoff removes the lower and lateral bony wall of the sinus up to its junction with the bulb and then takes away the bone covering the lateral and lower part of the bulb. He then lifts up the sinus and cuts out the lower membranous wall of the sinus. Through this opening the bulb can be entered, and if it should not be sufficiently large he removes the posterior triangular wall of the jugular fossa. Dr. Kipp said that in a few of his own cases in which the bone was carious up to the jugular fossa the removal of the bone exposed the jugular bulb without difficulty. Other surgeons have doubtless operated in the same way but have not reported their operations.

Dr. EAGLETON said that Dr. Knapp had done well to call attention to the fact that when possible the ligation should be made above the facial and the external jugular preserved. In the case reported by him in February, ligation above the facial might have prevented the fatal outcome. Dr. Knapp had failed to say anything of the importance of bleeding from the diploic vein as a diagnostic point of value prior to the opening of the sinus, to the value of which he had called attention in the paper read before the Section in February. As to the different methods of operation, the one spoken of by Dr. Knapp was the one in general use at the Newark Eye and Ear Infirmary. Neither Grunert's method nor the opening through the floor of the tympanic cavity had ever been performed. In a recent visit to one of the large European clinics he had an opportunity of observing three cases of jugular-bulb thrombosis operated by this latter method, in every one of which apparently a permanent facial paralysis resulted.

Dr. POOLEY said that when speaking of systemic infection we should not overlook the possibility of the occurrence of pneumonia, due to pneumococcus infection. The usual impression is that the pneumonia is due to an infarction, but a case had recently been brought to his attention of a child with an acute purulent otitis with pneumococcic infection which subsequently developed a very severe pneumonia, and this should be borne in mind when there is pneumococcic infection of the sinus. The occurrence of diarrhœa is another symptom in the course of a purulent infection. Macewen has suggested that cases which have a typhoid character may be mistaken for enteric fever, and that the infected material may pass through the tympanic cavity into nose and pharynx, and thence into the bowels and there become

the active cause of diarrhœa. This might be a valuable suggestion. Another point brought out by Dr. Knapp is that the infection may be first in the superior petrosal and pass thence into the sigmoid, or it may exist as independent foci in both the petrosal and the sigmoid. A point not referred to by Dr. Knapp, but presented in a most admirable paper by Dr. James F. McKernon, is that the cases of primary-bulb thrombosis generally occur in children, because the dome of the bulb is high up and only separated from the tympanic cavity by a thin wall. He did not know whether or not this was an original suggestion by Dr. McKernon, as he did not quote very extensively in the paper from the literature of the subject. In regard to the indications for ligature of the jugular, he did not see how anything could be added to the very complete presentation of the indications for this procedure given in a paper published by Dr. Whiting in 1898.

Dr. LIBMAN said that he was glad to note that Dr. Knapp used the terms general infection and metastatic infection rather than septicæmia and pyæmia. These latter terms are dangerous from a clinical standpoint because one really does not know what is meant, and many a patient has been lost because after a primary or a secondary operation toxic symptoms appeared, and the case was put down as septicæmia or sepsis without any proof that such was the case. He had been much interested in the study of infection from mastoid and ear disease, but unfortunately in the last few years the material for such study had not been very satisfactory, and he had not been able to thoroughly verify his observations; but as a rule they can be divided into several sets: First, local lesion in the mastoid or tympanic cavity. The condition may be one of great severity and yet there may be no bacteria in the blood current. In the second type, the bacteria may get into the blood current and remain there for a while and then disappear, or may remain until the death of the patient; in either event an endocarditis or other metastatic infection may be developed or not. In the third class, beginning with a local lesion and involvement of the sinus, a metastatic process is set up in the lungs, and bacteria may or may not be found beyond that point. These points have a certain importance in diagnosis because if you have a case which has been operated upon locally and the symptoms continue, and a blood culture is made with negative results, one has no right to assume that the patient has "septicæmia." The condition may be due to abscess in the

lungs, though you may not be able to diagnose it. One should go in and explore for a complication of the local lesion. In one case of sinus thrombosis the patient was operated upon and yet the symptoms continued. Two blood cultures were negative, and it was concluded that there must be some local condition which was keeping up the trouble. The boy died, and on autopsy a purulent thrombosis of the sinus was found lying on the posterior part of the posterior portion of the temporal bone. Dr. Gruening also had a case in which the symptoms continued after the mastoid had been examined and the blood culture was negative. A second operation was advised and a sinus thrombosis was found.

The presence of bacteria in the blood is not alone sufficient to say that the patient is suffering on that account. There must be a large number of bacteria in the blood to be able to make such a diagnosis. A small number plus endocarditis also can account for the symptoms. In two cases where he had made a diagnosis of sinus thrombosis by exclusion, he had excluded every other possible focus. One of these was a young man, aged nineteen, with a diagnosis of typhoid fever. The leucocyte count was not high, and there was nothing found upon which to make a diagnosis until the left ear was examined. Here was found a certain amount of evidence of otitis media, some tenderness of the mastoid, etc., but Dr. Gruening said not sufficient evidence to demand operation. A blood culture was taken and some streptococci were found, but the only lesion was the apparent slight tenderness of the mastoid. These two points taken together seemed to indicate that the streptococci were invading the system from the ear, and an exploratory operation was urged. This was done and a sinus thrombosis was found. The second case was a woman with an otitis media of some years' standing, and it was a question whether or not she had malaria. The finding of streptococci in the blood led us to believe that sufficient was going on in the mastoid process to go in and explore, and here also a sinus thrombosis was found. The patient recovered. The general belief now is that you do not find metastatic purulent deposits without a sinus thrombosis. Koerner has suggested that in some of these cases the lesion is in the veins in the bone (osteophlebitis). Dr. Libman said that he had not himself had opportunity to study this point.

Dr. FELIX COHN said that the treatment of sinus thrombosis

had been almost exclusively the subject of the discussion, while the subject of diagnosis and differential diagnosis had been referred to rather briefly. Dr. Knapp, in his paper, had also laid more stress on the operative procedures, intending, as he had stated in his opening remarks, that those points which he was obliged to treat more cursorily should be left for the discussion. Frequently in our practice we meet with cases in which the question of operation is of less importance than the establishment of a diagnosis. In many cases we cannot make a positive diagnosis of sinus thrombosis, but must satisfy ourselves with the "probable diagnosis" of the existence of a sinus thrombosis, and yet this latter condition, the establishment of a "probable diagnosis" only must be considered in formulating our indications for operative interference.

Our indications will be furthermore influenced by the fact whether we are dealing with the complications of a chronic suppurative or an acute suppurative inflammation. In complications in the course of chronic otorrhœa, our indications should naturally have a greater latitude, so that it becomes our duty to operate not only in "manifest" cases of thrombosis, but even in only "probable" cases, and for the reason that our indication for operation is always grave, and the briefest delay might prove fatal to the life of our patient. Furthermore, an exploratory operation in chronic inflammatory conditions is generally a fairly safe operative procedure.

Our indications in regard to complications of acute suppurative inflammations are, however, less broad. We can all agree with Dr. Knapp that with rare exceptions the presence of a "manifest" sinus thrombosis warrants an immediate operative interference—possibly with a few exceptions in individual cases. In regard, however, to those cases in which the diagnosis is only "probable"—and such cases are not at all infrequent,—a little conservatism and a little timely delay are wise and frequently indicated. A careful study of the differentially-diagnosed possibilities, even a delay, if necessary, of a few days will be advantageous to our patients, because exploratory operations in the course of acute suppurative inflammations are not always harmless procedures, and furthermore an immediate interference is not always urgent.

In acute cases the differential diagnosis between sinus thrombosis and other pathological conditions is also frequently very

difficult, both in regard to the differentiation with local inflammatory conditions, such as osteitis, osteo-phlebitis, and even an aural sepsis; that the latter condition exists without a complicating sinus thrombosis is admitted by most otologists. The osteo-phlebitis of Koerner, in its initial stages, likewise may simulate sinus thrombosis, and our temperature charts, the results of the blood examination, etc., may be almost identical with our findings in sinus thrombosis. As Dr. Knapp has already stated, the osteo-phlebitis of Koerner usually terminates favorably, and for that reason it behooves us to delay occasionally until a differential diagnosis is possible, so as not to operate for sinus thrombosis in cases of osteo-phlebitis or aural sepsis.

But not only local foci of inflammation may simulate sinus thrombosis; sometimes the acute infectious diseases—scarlet fever, measles, influenza, central pneumonia, and even malaria—may make up a symptomatology simulating a sinus thrombosis, and in the co-existence of the above named infectious diseases with aural disease the differential diagnosis may be most difficult, and the sepsis induced be erroneously referred to the aural complication. In acute suppurative inflammation, therefore, a little conservatism and a little delay, in order to establish a positive diagnosis, if possible, will be of benefit to our patients.

Dr. WHITING said that he was glad Dr. Knapp had emphasized the distinction between the various forms of infection, those from which metastatic processes resulted, and those which resulted in local inflammatory manifestations short of metastases. All operators have seen such manifestations in connection with sinus thrombosis, both in cases where the jugular has been resected and in cases where jugular resection has not been practised. Dr. Whiting illustrated his meaning by reporting a case upon which he had recently operated, in which there was bacterial absorption without the infection being sufficiently severe to produce a suppurative process. Dr. Whiting called the attention of the Section to a symptom of jugular-bulb thrombosis, which he had observed on three occasions and which he regarded as a valuable aid to diagnosis. These patients presented various characteristic symptoms and manifestations of sinus thrombosis, and yet when the sinus was exposed it appeared normal. Upon close inspection, however, the vein gave the impression of not being so large and full as a healthy sinus should be, and upon palpation it was not only "fluctuant" but softer and less resisting

than would be the case under normal conditions. As near as he could describe it, it resembled the fluctuancy of a rubber glove finger filled with water. When this sinus was incised an immediate and lively gush of blood escaped, but the volume of the blood current was less copious and forcible than would have followed the incision of a normal sinus. Upon opening the sinus in the first of these cases, it bled immediately, and the impression at first created was that the vein was patent and without clot, but in the subsequent exposure of the sinus downward toward the bulb, the emissary vein was lacerated, revealing a fibrino-plastic clot protruding from its torn lumen. This experience convinced the operator of the certainty that there was a thrombus in or about the bulb. The sinus was packed at its distal end, the bulb was then opened freely and found filled with a partly organized clot. He considered this symptom one of importance, and had no doubt but that others of those present would have an opportunity to observe it.

As regards the indications for resecting the jugular, Dr. Whiting considered that inability to re-establish the circulation from the bulb was a positive indication of resection of the jugular, whether the clot contained at the bulb had undergone purulent disintegration or not; also, that the jugular should be resected in every instance when the clot in the sinus had undergone purulent disintegration in any portion.

The speaker regarded intravenous infusion of normal saline solution in these cases, whether during the operation or immediately after its completion, as a matter of the greatest importance, and a procedure the value of which could not be overestimated. Where the patient is in an extreme condition, it is an excellent plan to begin the infusion before the operation is completed.

Dr. BERENS said that he would like to call attention to a class of cases that had only been touched upon in the paper, namely, cases of descending phlebitis extending down the sheath of the vein, or the vein walls, beginning as a septic thrombosis. About a year ago he had had a case where there was a septic thrombosis of the lateral sinus. The jugular was resected above the entrance of the facial vein, but the temperature and other symptoms persisted and the wound was reopened. The walls of the jugular were found to be striated and infiltrated with a whitish material. The blood in the vein was fluid. The striation extended down

as far as could be reached, to beneath the clavicle, where it was tied. In the course of a few days the patient died from sepsis. A post-mortem was not allowed, but the wound was enlarged and examined down to the vena cava, the walls of which were also found to contain these whitish striations. A microscopic examination later showed that the walls of the innominate vein, and jugular were infected by a mixed infection of pneumococci and staphylococci—the descending phlebitis extending all the way from the lateral sinus to the ends of the large vessels of the chest. He thought the fact of the possibility of such a condition is a strong argument for the early exsection of the jugular, besides the fact of the possibility of small particles of clot entering the circulation from the jugular bulb when one is curetting in that region. When the jugular vein is involved, we should waste no time in going into the neck and examining the vein and excising a portion of it after it is tied, subjecting this to microscopic examination, and being guided by that as to whether or not the whole vein should be exsected. If a clot should be found in the sinus and a practically healthy sinus should be found on each side of the clot, he saw no reason why we should not cut off the circulation by plugs and open the sinus without going into the jugular; but where the clot extends into the bulb, good surgery demands that we tie the vein somewhere below the clot.

Dr. RICHARDS said that he had unfortunately not heard Dr. Knapp's paper, but had been interested in that portion of the discussion relating to the question of primary jugular-bulb thrombosis. He had seen in the recent literature reports of cases diagnosed as such in which the route of infection was said to have been through the tympanic floor, and had been struck by the lack of evidence upon which these statements had been based. The chief conditions suggesting the diagnosis were: First, the rapidity of onset of sinus symptoms following acute middle-ear suppuration; second, the apparent absence of mastoid involvement, and the finding within the sinus of a thrombus which invaded the bulb. Consider these factors separately: First, the rapidity of onset of sinus symptoms following middle-ear suppuration is in no way distinctive of primary bulb thrombosis, nor suggestive that the route of infection is through the floor of the tympanum. Though the sinus knee is frequently farther removed by distance from the cavity of the middle ear

than is the dome of the jugular bulb, yet it is in exceedingly close relation to this cavity through the venules which arise in the vicinity of the antrum, traverse the mastoid, and empty directly into the sigmoid sinus about its knee. This explains the extreme rapidity with which thrombosis may occur in the upper portion of the descending sinus limb. The element of time as a factor in the differential diagnosis of primary bulb thrombosis is not based upon firm anatomical grounds. He had operated recently upon a case in which the sinus symptoms had developed within forty-eight hours after the inception of the middle-ear suppuration. The clot was located about the sinus knee, the bulb being altogether uninvolved. He had seen other cases similar to this in their rapidity of onset, and in which the thrombi were located entirely above the bulb. From the clinical standpoint also the element of time as a differentiating factor in the diagnosis of primary bulb thrombosis is of little significance. Second: The fact that the mastoid is not macroscopically involved does not entitle us to assume that the bone is not invaded by bacteria. The appearance of bone (particularly of that diploic structure found in young children) is exceptionally misleading. We are frequently unable to tell whether such bone is macroscopically involved or not—much less able to decide with the naked eye the question of its bacterial invasion. It would be a very difficult problem to examine microscopically all mastoid structure along which an infective process might travel in reaching the sinus. Though we have a sinus thrombosis with the clot invading the bulb and could be assured of the fact that the mastoid was free from bacteria, this does not entitle us to assume that the route of infection is through the floor of the tympanum. As before stated, there are springing from the antrum numerous small venules (often, however, of sufficient size to be seen with the naked eye) which traverse the mastoid field and pour their contents into the sigmoid sinus at its knee. Along these avenues bacteria may be carried to and find lodgment in the wall of the sinus without the intervening mastoid structure being involved—*i. e.*, we have extension by local metastases. At the site of deposit a thrombus develops and extends downward to the bulb. Operating upon such a case and finding the mastoid apparently normal, it might be argued that the infection took place through the tympanic floor, that the jugular bulb was primarily invaded, and that the clot had extended upward from this point. He had reported

recently in the *New York and Philadelphia Medical Journal* a case of sinus thrombosis interesting in this connection. The mastoid appeared absolutely uninvolved, the bone was intensely sclerotic, the clot was confined to the upper third of the descending limb and did not invade the bulb. In this instance had operation been deferred for twenty-four or forty-eight hours the clot in all probability would have extended down into the lower portion of the sigmoid or into the bulb. Then it might have been claimed that the case was one of primary bulb thrombosis and that infection occurred through the floor of the tympanum.

A second route frequently taken by the infective process and one often mapped out in bones the seat of chronic suppuration, is along the deep cells extending vertically from the floor of the aditus and antrum downward over the posterior semicircular canal toward the tip. At the lower border of the semicircular canal, these cells (well demonstrated in pneumatic bones) lead inward toward that constricted portion of the horizontal limb of the sinus near the bulb. We operate upon such a case, and finding the thrombus only in the lower deep portion of the sigmoid, infer that it originated in the bulb and that the infection was through the tympanic floor, unless by chance the path of the disease along the above-mentioned cells is so grossly mapped out as to be visible to the naked eye. To report such cases as cases of primary jugular-bulb thrombosis, claiming that the route of infection is through the tympanic floor, upon such evidence, is altogether unwarrantable.

Dr. F. B. SPRAGUE said that from his observation he felt that some operators were too much inclined to ligate the internal jugular. Personally he had had but about a dozen cases and he had not ligated in any of them, but was in favor of ligation in proper cases. All but three of the cases had gotten well, and these probably would have died anyway. One point to be considered in collateral circulation was that there is a certain amount of collateral circulation which takes place in the posterior surgical triangle, which goes to the posterior part of the neck instead of through the jugular, so if we do ligate the jugular we are not shutting off every avenue of infection to the body. In regard to the question of diagnosis, he cited as illustration a case on which he had operated Monday. The boy had been in the diphtheria ward of the hospital in January suffering from a very severe attack in which the membrane was said to have come to the

border of the teeth and on the cheeks, and when it was exfoliated it came off in a great slough. He was very sick, but was finally discharged as perfectly well. After two weeks he was afflicted with acute middle-ear inflammation, which broke of itself and discharged, and nothing was thought of it. In the meantime his brother was taken with infectious cerebro-spinal meningitis, and last week this boy was again brought to the hospital in a very excited and nervous condition, temperature 105° , Kernig's sign in both legs, tache meningeale, and suggestive evidence of cerebro-spinal meningitis. He had a suppurative ear with a small amount of discharge in the canal. On cleansing the canal it was found to be reddened, and the drumhead was also reddened, with a small perforation in the upper anterior portion, a very unusual site. The other drumhead was intensely congested, and the superior wall of the canal also, as in meningeal engorgement. He did not wish to operate immediately as he saw no positive evidences for doing so, being naturally influenced by the meningeal history. The temperature was 104° to 105° , high tension, rapid pulse, and an extremely nervous condition. The blood-count was only 8000. The case was operated upon on Monday, as after a day or two there seemed to be some suggestion of trouble in the mastoid. No pus was found, but the mastoid was softened and there was a small accumulation of cheesy deposit in one small cell. Upon working through to the sinus, the inner wall was found to be eroded. The sinus was opened and a clot removed which extended from the knee to the bulb. A flow was obtained posteriorly, but not from the bulb. The patient was in such a bad condition that it was not thought well to proceed farther. For the last forty-eight hours his temperature has been 102° , and he is apparently doing better, although of course is still in a bad condition. The question of diagnosis here lay between cerebro-spinal meningitis and sinus thrombosis.

Dr. Sprague also told of another case operated upon last week, the patient having been operated upon two or three times previously in St. Louis, and then by a colleague in Providence. He had had a profuse discharge of pus all this time, and at the first operation it resembled an old appendicitis pus in odor. When Dr. Sprague first examined the case he thought he saw the point where the pus came from—apparently through the floor of the tympanum. At that time the patient was beginning to run the characteristic temperature curve of sinus thrombosis, mounting

higher each day to 104°. A second operation was advised, thinking there was some trouble in the bulb. The sinus was practically free, the blood was fluid, and nothing observed to warrant opening it, but a lot of necrotic tissue was removed from the mastoid. Following into the labyrinth and the semicircular canals necrotic tissue was also removed. A curette was easily passed through the floor of the tympanum, reaching to the side of the naso-pharynx. For a day or two after the operation, the pus came from this retropharyngeal abscess, but then ceased, and the man is apparently doing all right. This is another case of apparent septic sinus thrombosis and no thrombosis at all. The Doctor also told of a case of meningitis, which died a few weeks ago, and upon autopsy an old clot was found in one of the sigmoid sinuses, which had evidently been there for many years, but had given the man no trouble whatever, although he was a little deaf on that side. This was an instance where an inflammation of the sinus with thrombosis recovered without operation of any kind.

Dr. KNAPP, in conclusion, said that he had intended his paper to be an introduction to a general discussion of the subject without having anything new to present. He was a little disappointed that in the discussion the conservative side of the question was not better represented, for he thought that the tendency is to treat sinus cases too radically. He was also a little disappointed that the speakers had not given more definite indications for ligating the jugular vein.

REPORT ON THE PROGRESS IN OTOLOGY DURING THE THIRD QUARTER OF 1905.

BY PROF. ARTHUR HARTMANN, BERLIN.

Translated by Dr. ARNOLD KNAPP.

ANATOMY AND PHYSIOLOGY.

179. VERNIEUWE. On the embryonic and post-embryonic development of the cochlea in mammals and in man. *Annales de la société de médecine de Gand*, vol. iii., 1905.

180. GELLÉ. Adenopathies in nasal and rhino-pharyngeal affections. *Arch. internat. d'otologie*, etc., vol. xx., p. 1.

181. RÉTHI. The secretory nerve centres of the soft palate. *Wiener med. Presse*, No. 48, 1904.

182. HAJEK. On the so-called intra-epithelial glands of the nasal mucous membrane. *Arch. f. Laryng.*, vol. xvii., Part 1.

183. KRETSCHMANN. The acoustic function of the air-containing cavities in the ear. *Pflüger's Arch. f. d. ges. Physiol.*, vol. cviii., pp. 499-536.

184. ALEXANDER and BÁRÁNY. A psycho-physiologic investigation on the significance of the statolithic apparatus for orientation in space in the normal and in deaf-mutes. *A. f. O.*, vol. lxv., p. 187.

179. VERNIEUWE. *On the embryonic and post-embryonic development of the cochlea in mammals and in man.*

The development of the cochlea was studied in specimens of white mice, rats, bats, guinea-pigs, cats, dogs, and human embryos, with the following conclusions. The various parts of the cochlear duct are developed more rapidly at the base than at the apex. The tympanic scala is formed before the vestibular one. The second column as well as the external rod cells are developed from the small epithelial ridge, while the inner rod

cells are developed from the larger epithelial ridge. Corti's membrane appears on the surface of the large epithelial ridge. It is a cuticular structure. There are twenty-two illustrations.

OPPIKOFER.

180. GELLÉ. *Adenopathies in nasal and rhino-pharyngeal affections.*

The course of the lymphatic vessels in the nose and nasopharynx is described. Then the various diseases of the nose are given which lead to glandular swellings.

OPPIKOFER.

181. RÉTHI. *The secretory nerve centres of the soft palate.*

This examination was made exclusively on cats.

I. The secretory facial nucleus. About 6mm anterior to the calamus scriptorius and about 2mm distant from the middle there is no distinct secretion. The area in which the minimal current furnishes secretion is about 1mm square. The nucleus of the secretory fibres which are contained in the facial trunk is situated underneath the fourth ventricle, and there is a nucleus for each side.

II. The secretory sympathetic nucleus is situated at the level of the fifth or the sixth cervical vertebra on each side of the middle line. The secretory fibres leave the spinal cord at about the first or the second dorsal vertebra and lose themselves in the terminal strand.

WANNER.

182. HAJEK. *On the so-called intra-epithelial glands of the nasal mucous membrane.*

The first part of this paper treats the morphology of the so-called intra-epithelial glands. In the second part, in regard to the origin of the bud-like processes, we find the curious statement that the goblet cells are cast off in great quantities on account of the increased mucous secretion. There is, however, no reason given for this assumption, nor are there any histologic pictures. On this basis the author endeavors to make a distinction between the goblet cells of the buds and those of the rest of the mucous membrane, and criticises the opinion of those authors who regard these structures as intra-epithelial glands. We, however, find no reason to change our views in these statements.

ZARNIKO.

183. KRETSCHMANN. *The acoustic function of the air-containing cavities in the ear.*

The main feature of this paper is to show that the middle-ear apparatus increases feeble sound and diminishes sound that is too strong. Seventeen fundamental experiments are described. The author at first endeavors to show that solid bodies are caused to vibrate and to sound with air waves. The transmission of a certain amount of sound from air to a solid body is not to be doubted, though the statement of the author, that the increase in pitch on approaching a solid mass with a tuning-fork depends upon the resonance of the latter, has not been proven. Six quadrilateral pieces of wood 15cm long and $1\frac{1}{2}\text{cm}$ thick are united by bands to form a block. If the tuning-fork is then held in front of the long surface the increase of the pitch is slight. The increase was greater on moving the fork to the edge, but greatest when it was placed opposite the façade of the block. This has nothing to do with rods and rod vibrations, as the author believes, because the same phenomenon can be observed with flat, empty boxes of tin or paper. In my own experiments which have been performed with a small *a'* tuning-fork, the important point was the size of the surface in front of which the fork was placed. If I made use of a table or the wall of a room, there was no increment. There was, however, an increase if a surface about as broad as your hand was selected, and especially if I approached a thin ruler $1\frac{1}{2}\text{cm}$ broad with its edge parallel to the handle of the tuning-fork. Instead of a ruler, a round or a quadrilateral rod of $1\text{-}2\text{cm}$ in diameter may be used. This is not true resonance, but a disturbance of the sound-distribution surrounding the fork, as is shown if we place the fork on a solid body. The ruler resonates the least and the table the most; in other words, just the opposite conditions to the author's experiments. I should like in this connection to mention the following observations: If I approach a small ruler to one margin of the tuning-fork so that the long diameter of the ruler is parallel to the blade of the fork and the diagonals of the blade sections are situated in the area of the ruler, a decided intensity of sound is present. This is explained because the ruler disturbs the well-known interference of sound in a diagonal plane and not on account of a corresponding co-vibration of the ruler. The third attempt of the author shows an increment of the sound in the case where the fork is passed towards the hand and the long axis of the hand is parallel to that

of the fork. If the hand is situated at right angles to the fork, the effect is much less. The author believes from this that living bone is caused to vibrate by sound waves and the intensity depends upon the direction of the structure, which is unquestionably not quite correct, because an empty glove shows quite similar appearances. It has been previously shown by other authors that sound is taken up by bone from air. Then the author dilates upon the acoustic properties of cartilage without bringing anything new, and in the second part of his experiments he treats the question in what way the air spaces of hollow bodies react to sound waves. He studied the resonance of glass vessels which were empty or filled with pieces of cork. The mouths were either open or closed with a rubber membrane which had one or two openings closed with membranes, and concludes that we have in the middle-ear cavities an apparatus for increasing the sound, a conclusion which does not seem to be justified because the experimental conditions are surely very different from the true conditions of the middle ear. If a rod in the form of a columella was placed between the two membranes which closed the two opposite openings of a glass resonator, it was shown that the transmitted sound was increased to the greatest extent in a middle pitch. The author, therefore, compares a columella and the ossicular chain with the sounding-post of the violin, and believes that the inner muscles of the ear are necessary to produce the desirable degree of tension. Similar hypotheses on tension have been previously suggested without being generally accepted, and this author brings no particularly new argument for their correctness. Finally experiments are described with apparatuses which are made up of an air and of a water chamber and with membranes like the drum membrane and the labyrinth windows and columella. But this apparatus differs not only in its dimensions, but fundamentally, from the natural one, especially because the water in it adjoins the air but in the labyrinth is closed off in all directions, so that the results can hardly be transferred to the ear.

SCHAEFER.

184. ALEXANDER and BÁRÁNY. *A psycho-physiologic investigation on the significance of the statolithic apparatus for orientation in space in the normal and in deaf-mutes.*

Alexander and Bárány's experiments were instituted on static orientation with erect head, with head bent forward and

rotated, as well as by bending of the head and of the body. The results were the same in normal and in deaf-mute persons, in whom a destruction of the statolithic apparatus can be assumed. The authors conclude that under these conditions and especially in daily life excitation of the statolithic apparatus is of no importance for orientation in space. The question whether under certain conditions, when other sensations are excluded, the statolithic apparatus is not made use of for orientations has not been determined by these experiments.

HAENEL.

GENERAL.

a—REPORTS.

185. GRUNERT and DALLMANN. **Annual Report of the Royal Ear Clinic in Halle**, from April 1, 1904, to March 31, 1905. *A. f. O.*, vol. lxx., p. 55.

186. KASSEL. **School and ear diseases.** *Österreichische Arztezeitung*, No. 18, 1905.

187. SACHS. **Examination of the auditory organs of railroad employees.** *A. f. O.*, vol. lxx., p. 7.

185. GRUNERT and DALLMANN. *Annual report of the Royal Ear Clinic in Halle.*

After the statistical description of the material during the past year, five cases are completely reported where mastoiditis with sinus thrombosis was healed by ligation of the jugular vein or by the sinus operation. Fifteen of the nineteen fatal cases are fully reported. Of these, Case 1 is of especial interest,—a patient who had been repeatedly under observation and treatment in the clinics for a period of twenty-two years on account of symptoms which were very difficult to explain and led to many diagnostic mistakes and unnecessary operations, including trepanning for supposed abscesses in the temporal and cerebellar lobes. In Case 5 a fistula was found in the semicircular canal at otoscopic examination, which was discharging pus. The labyrinth was exposed and a radical mastoid operation was performed. Death resulted from intracranial pressure from a large not diagnosticated cerebellar abscess. Case 12: death from diffuse purulent meningitis, which apparently existed before the operation. Complete operation, puncture of the cerebellum. The striking result of lumbar puncture performed before operation was a perfectly clear fluid with one or two staphylococcus

colonies in culture, and can be explained in either of the following ways. It is either a contamination of the lumbar fluid, which was sterile and obtained from the spinal canal, which was closed off above by a plastic exudate, or this is an example of a previously unknown condition of a clear lumbar fluid in diffuse purulent leptomeningitis.

HAENEL.

186. KASSEL. *School and ear diseases.*

In the schools in Posen there are an eye doctor and a physician for diseases of the ears, throat, and nose. The cases are referred to these physicians by the school physician, and they then undertake the treatment. The author examined children who had been referred to them because they were either deaf or their ears discharged, or they suffered from continuous colds and usually kept their mouths open. Notes made by the teachers were generally found correct. The purpose of the school is, therefore, also to show the child the value of a healthy ear and eye and normal breathing. In 4522 children 2.4 % were deaf and 2.9 % were affected with purulent otitis. This number increased in the higher classes. That special classes for the deaf should be instituted the author agrees entirely with Hartmann.

WANNER.

187. SACHS. *Examination of the auditory organs of railroad employees.*

Sachs was unable to determine any diminution of the hearing in the ordinary train service; he was able, however, to determine the dangerous effect of the service on the ear, especially in the labyrinth, after examining the engineers. The disturbances appear first after a service of a number of years. Among the engineers, under thirty-five years of age, there were marked labyrinth disturbances in 8 %, while in those over forty-five the percentage was 46. Though this seems formidable from the point of safety of the service, it is not so very important, because practically only optical signals are used. Of the accidents in the stations not a single one could be referred to a disturbance of hearing of the engine driver or the brakeman. The injurious effect of service on the locomotive upon the respiratory passages is shown by the frequent occurrence of atrophy of the nasal mucous membrane (in 25 % of the cases). The reliability of the statistical examinations of railroad employees suffers from the dissimulation frequently practised, especially in regard to symptoms such as tinnitus and vertigo.

HAENEL.

b.—GENERAL PATHOLOGY AND SYMPTOMATOLOGY.

188. BLAU. **Experimental studies on the action of Fowler's solution on the ear.** *A. f. O.*, vol. lxx., p. 26.

189. TAUBER. **Cavernous hæangioma of the head.** *Wiener med. Wochenschr.*, No. 19, 1905.

190. WEICHSELBAUM and GHON. **The micrococcus meningitidis cerebrospinalis as the cause of endocarditis, and its occurrence in the noses of healthy and diseased persons.** *Wiener klin. Wochenschr.*, No. 24, 1905.

191. HENNEBERT. **Oto-ocular reflexes.** *La presse oto-laryngologique Belge*, 1905, part 5.

192. BAGINSKY. **Aural economics.** *Berliner klin. Wochenschr.*, No 37, 1905.

193. KOYLE. **Pseudacousma.** *The Laryngoscope*, June, 1905.

194. HARRIS. **Pathologic findings in intracranial complications of middle-ear disease.** *The Laryngoscope*, July, 1905.

195. HILDESHEIM. **Deafness and epidemic cerebro-spinal meningitis and posterior basic meningitis.** *The Lancet*, May 20, 1905.

196. CLARKE. **On some symptoms of cerebellar tumors.** *The Bristol Medico-Chirurgical Journal*, June, 1905.

197. RANDALL. **Notes on otitic epilepsy.** *American Journal Med. Science*, August, 1905.

188. BLAU. *Experimental studies on the action of Fowler's solution on the ear.*

Blau's experiments on animals show that arsenic reacts in a similar manner to quinine, salicylic acid, and aspirin, and causes distinct changes in the ganglion cells of the spiral ganglion and of the ganglion of the Scarpa (changes in the cochlear protoplasm, especially in Nissl's bodies and in the nuclear structure).

HAENEL.

189. TAUBER. *Cavernous hæangioma of the head.*

A patient, twenty-three years of age, has suffered since the sixth year from an enlargement of the right cheek and a tumor in the right temporal region. There has been deafness on the right side for ten years. There is a defect in the large wing of the sphenoid, the zygomatic arch is eroded in a number of places, and the inferior maxilla shows some defects.

The right auricle is situated lower than normally and is elongated; the cartilaginous canal is contracted in the form of a fissure. Shrapnell's membrane is a bluish transparent area presumably from a malposition of a dilated vein in the tegmen. The left ear is diseased. On using the X-rays, both frontal sinuses are found unusually large.

The cause is supposed to be a persistence of the primordial anastomoses between the external jugular vein, the superior petrosal sinus, and the lateral sinus.

WANNER.

190. WEICHSELBAUM and GHON. *The micrococcus meningitidis cerebro-spinalis as the cause of endocarditis, and its occurrence in the noses of healthy and diseased persons.*

In nineteen cases, organisms were found in eighteen in the discharge from the nasal cavities and the nasal pharynx, which on microscopic examination resemble morphologically and by staining the micrococcus of meningitis. The authors conclude that in the rhinitis, which so frequently accompanies cerebro-spinal meningitis, this micrococcus is present.

This inflammation of the nose and naso-pharynx is the process by which the micrococcus is transmitted to other persons. The transmission by discharge is only possible under conditions which do not interfere with the viability of the micrococcus.

The examinations on the occurrence of these micrococci in the normal naso-pharynx were only made on those persons who came in contact with meningitis patients. In twenty-four the micrococcus was present definitely in three. The investigations, therefore, show that this micrococcus may be present in perfectly healthy persons even if there is no inflammation in the nose.

WANNER.

191. HENNEBERT. *Oto-ocular reflexes.*

The two following reflex phenomena are reported as contributing to the more exact diagnosis of diseases of the labyrinth.

I. An oto-ocular motor reflex observed only in two persons who suffered from hereditary syphilis. In one the movements of massage of the right hammer produced vertigo and a sudden horizontal deviation of both eyes to the left, which then immediately returned to the former position. There was no nystagmus, but definite lateral movements and immediate return to the median position. If the patient fixes an object, he observes a lateral displacement not only during the massage on the right side but also on that of the left, though when on the left side there were no tinnitus, no vertigo, and no changes in the ocular position. This second phenomenon is called subjective oto-ocular reflex. In the second patient this reflex showed the following peculiarities: On Gellé's experiment on the right side, both eyes turned sharply to the right, with a gradual return to the median

position; on Gellé's experiment on the left side, there is moderate deviation of the left upwards. On the use of Delstanche's rarefactor, the opposite condition results—the eyes turn to the opposite side. There is, therefore, a difference, whether one exerts centrifugal or centripetal pressure.

II. The subjective oto-ocular reflex consists in a displacement in the position of objects, usually in a horizontal, rarely in a vertical, and more rarely in an oblique sense, without the slightest variation in position of the eyes.

Both of these reflexes are symptoms of an irritation of the ampullar apparatus, which is transmitted by the vestibular nerve to the Deiters nucleus, and from there to the oculomotor nucleus of the same and of the opposite side.

BRANDT.

192. BAGINSKY. *Aural economics.*

A collection of the principal data occurring in examining aural injuries, which does not furnish any new points.

MÜLLER.

193. KOYLE, F. H. *Pseudacousma.*

Pseudacousma is false hearing, a false perception of pitch in one or both ears, differentiated from diplacousis, a reduplication of notes or noises, and from paracousis, an abnormal perception of sound. Of the two cases reported, the *first* concerned a physician, aged sixty-one years, who had contracted a severe cold, followed by diminished audition, pain, fulness without tinnitus. After the use of the galvanic current, a sensation of tension in the left ear was followed by a snap, like the breaking of a string, which injured the integrity of the stapedius. Now profound tinnitus of the marine-shell type appeared. All ordinary tones were perceived by the left ear from 3 to 5 commas of Pythagoras ($\frac{1}{4}$ of a semitone) lower in pitch than by the right. Dysacousma or dysæsthesia acustica, pain and distress for all musical sounds. The audition was impaired, tinnitus increased, but relieved by the recumbent position, and disappeared during occlusion of the left auditory canal. The long axis of the manubrium mallei had rotated, the short process was prominent. A. S.: C^0 and C^1 — negative Rinne. C^2 and C^3 — positive Rinne with greatly lowered Ac; and for C and C^1 — $Ac = Bc$. In both ears the lower tone limit was raised, diminished (senile) Bc. The upper tone limit was more lowered in the left ear. C and C^0 — positive Weber. $W = 2''$, Wh. = $1'$. C^0 , C, and C^1 lower for Ac, and Bc lower in left ear by 5, 5, and 3 commas respectively, while C^2 , C^3 , and C^4

were heard 2, 5, and 2 commas higher respectively in the same ear. The pneumatic otoscope had a beneficial result. The *second* was the *writer's* case, and differed but little from Case 1 as to the pseudacousma, except in etiology, physical characteristics and in treatment. He had in the left ear an Eustachian and middle-ear lesion, and lithæmia responsible for the tinnitus. False hearing had been noticed for seven months. Between the tinnitus and the false hearing no relation could be demonstrated. The false hearing disappeared after proper dietetic and physical conditions had been established in connection with operations on the nose and treatment of catarrhal condition of Eustachian tube.

M. TOEPLITZ.

194. HARRIS, T. J.. *Pathologic findings in intracranial complications of middle-ear disease.*

During the past ten years there have been treated in the Manhattan Eye, Ear, and Throat Hospital 41,799 cases of ear disease. Of these 32,486 suffered with disease of the middle ear, and 12,744 were of a suppurative nature. Among these were 60 cases of intracranial disease: sinus thrombosis 23, brain abscess 7, meningitis 30. A. Of the 23 cases of sinus thrombosis, 14 died, 9 recovered. The jugular vein was ligated in 15 cases, not ligated in 8. Among the ligated cases, 6 recovered, 9 died; of those not ligated, 3 recovered and 6 died. B. There were 7 cases of brain abscess, with 7 deaths: in temporo-sphenoidal lobe 6 times, in the cerebellum once; 3 cases after acute, 4 after chronic, suppuration of the middle ear. C. Of 30 cases of meningitis, 29 died, 1 recovered; of these, 6 were children under two years of age, 1 child of six, 1 of eight, and the rest were adults. In 15 of these there was chronic suppuration of the middle ear, in 10 an acute, in 4 the character was not given, in 1 the ear was healthy. Bacteriology: 3 cases had streptococcus, 6 diplococcus, 6 a mixed infection. Eighty-three radical mastoids were followed by 10 cases of fatal meningitis; in 2 not until after the second operation, when skin grafting had been practised and the wound closed. Meningitis also followed the simple mastoid operation in 20 cases.

M. TOEPLITZ.

195. HILDESHEIM, O. *Deafness and epidemic cerebro-spinal meningitis and posterior basic meningitis.*

Hildesheim found deafness follow directly as a sequel of posterior basic meningitis in only one case amongst 100.

ARTHUR CHEATLE.

196. Clarke, J. Mitchell. *On some symptoms of cerebellar tumors.*

Clarke relates two most remarkable cases of cerebellar tumor in which complete deafness and very distressing tinnitus long preceded the pathognomonic symptoms of cerebellar tumor. In one case the tumor was found to be a fibroma the size of a small apple; it was oval in shape, and involved the right lateral lobe chiefly and very extensively, and also extended into the middle and left lateral lobes. The pons and medulla were flattened from pressure. The exact origin and relation of the growth could not be determined. In the other case no post-mortem examination is reported.

He also relates two cases in which Ménière's attacks were the first symptoms of cerebellar tumor. He points out that optic neuritis occurs early in the majority of cases of cerebellar growth, and serves to differentiate such cases from pure internal ear disease.

In the first of these two cases a large fibroma was found in the left lateral cerebellar lobe, and in the second a large soft sarcoma of loose structure was present in the central portion of the middle lobe, extending for a considerable size into each lateral lobe, replacing the greater part of the white matter.

ARTHUR CHEATLE.

197. RANDALL, B. A. *Notes on otitic epilepsy.*

A boy, aged eight years, had an acute suppuration of the left ear after a drenching by a hose, with penetration of water into that ear. When the suppuration slackened, epileptiform attacks set in, sometimes four or five in the day. The leucocyte count decreased from 18,000 to 8,000. There was a moderate discharge of yellow pus from the left ear. The fundus was filled by a fibrous polyp mass attached by a broad base up and forward, and bare bone was felt beyond it. Attacks of rigidity, switching of the right thigh and leg and of the left hand, rapid winking of both eyes, and unconsciousness for sixty seconds were observed every day. After tympanic exenteration they did not cease, but were even more numerous. Only after complete exenteration of the mastoid containing unhealthy bone and granulations, the attacks decreased in frequency and severity, until they stopped entirely during the last three months.

M. TOEPLITZ.

C.—METHODS OF EXAMINATION AND TREATMENT.

198. FREY. The influence of maritime climate and sea baths on the ear. *Wiener med. Presse*, No. 50, 1904.

199. DELNEUVILLE. Medication by carbonic gas at Spa in diseases of the throat, nose, ears, and eyes. *La presse oto-laryngologique Belge*, No. 4, 1905.

200. NEUMANN. Severe operations on the ear in local anæsthesia. *Wiener klin. Wochenschr.*, No. 41, 1904.

201. SEIFERT. On alypin. *Deutsche med. Wochenschr.*, No. 34, 1905.

202. NEUENBORN. Ethyl-chlorid narcosis in the treatment of the nose, throat, and ear. *Arch. f. Laryng.*, vol. xvii., No. 1.

203. BAUMGARTEN. Therapeutic experience. *Wiener klin. therapeut. Wochenschr.*, Nos. 31 and 32, 1905.

204. KREIN. A new apparatus for subcutaneous paraffin injections. *Wiener klin. therapeutische Wochenschr.*, No. 42, 1904.

205. BARTEL. An apparatus for inhalation experiments. *Wiener klin. Wochenschr.*, No. 30, 1905.

206. HARTL and HERRMANN. On the inhalation of vapors containing bacteria. *Wiener klin. Wochenschr.*, No. 30, 1905.

207. SCHILD. Ethyl-chlorid anæsthesia of the membrana tympani and external auditory canal. *Journ. Amer. Med. Assoc.*, July 8, 1905.

208. WAGGETT. A note on skin grafting. *Journal of Laryngology*, July, 1905.

198. FREY. *The influence of maritime climate and sea baths on the ear.*

After a survey of the literature on the subject, the advantages and disadvantages of the sea climate for the various ear diseases are treated.

The sea baths of the Mediterranean are of value to relieve catarrhal middle-ear processes, and the infiltrations and swellings of the mucous membranes after otitis disappear more rapidly. Especially in cases where an operation had been undertaken on account of chronic suppuration, the sea baths were very advantageous, and in cases after diphtheria and scarlet fever.

Chronic adhesive processes and sclerosis are not influenced, while the question of their value in diseases of the internal ear is not decided. They are improved if associated with constitutional disturbances, such as anæmia, chlorosis, etc. In any case a residence at the seashore is not essential, but it may be of distinct advantage.

WANNER.

199. DELNEUVILLE. *Medication by carbonic gas at Spa in diseases of the throat, nose, ears, and eyes.*

The carbonic-acid springs at Spa are recommended not only

for anæmia and chlorosis and diseases of the heart and vascular system, but they have recently been made use of in affections of the respiratory passages. The author first discusses the physiological peculiarities of carbonic acid, its origin and production, and then describes the methods of use. The carbonic acid may be used in water by means of a nasal douche, in the form of a spray (36-40° C.), as a nasal bath, and finally as inhalations in especially adapted rooms. The carbonic acid can even be used in the gaseous form as a nose douche.

The carbonic acid can be used to advantage in aural suppurations, in chronic catarrhs of the nose and throat complicating ear troubles. Its value in nervous deafness rests probably upon suggestion. The author has observed improvement in ozæna, and recovery in cases of chronic rhinitis. Improvement has also been observed in hay-fever.

BRANDT.

200. NEUMANN. *Severe operations on the ear in local anæsthesia.*

To anæsthetize the drum membrane, a mixture of equal parts of cocain, carbolic acid, and menthol is used. This is applied with a cotton pledget directly on the drum. The results are moderate.

For operations in the tympanum where there is a defect of the drum, a solution of 5-10% cocain is used. The drum membrane and the canal, of course, remain sensitive. The same thing occurred when an injection of a 10% solution into a polyp was practised.

The new method of Neumann consists in injecting under the periosteum a warm 1% solution of cocain and tonogen (5 drops of tonogen to 1ccm of 1% solution of cocain).

In 20 acute cases of disease of the mastoid process, the painlessness in many was absolute; hemorrhage, exceedingly slight.

The needle is introduced obliquely to the surface of the mastoid process down to the bone and 3-4ccm of the solution, heated to 50° C., are injected under the periosteum. A single injection is sufficient to produce complete anæsthesia.

The method is of no value in subperiosteal abscesses.

Cases where the radical operation was performed could be operated upon in absolute anæsthesia to the end. In these, instead of using cocain, a 1% solution of eucain with tonogen was used. Three syringefuls were injected under the periosteum of the

mastoid process, 1-2 syringefuls behind the auricle, under the periosteum of the anterior margin of the mastoid process, and 2-3 syringefuls from the auditory canal into the periosteum of the bony canal. After 20 minutes the cutaneous incision and the rest of the operation were free from pain. The plastic step was also free from pain. It is possible to remove the hammer and anvil and resect the outer wall of the attic in absolute anæsthesia by this means after disinfecting the canal with a solution of lysol and peroxid of hydrogen. After anæsthetizing with a fine spray of chlorid of ethyl, the curved needle of the spurting syringe is introduced under and posteriorly to the margin between the cartilaginous and bony canal down to the bone and the fluid is injected under the periosteum. In operations of some length part of a syringeful is injected at the anterior superior wall of the canal; a single syringe suffices. After the injection it is better to wait from 10-20 minutes. The following operations were performed after this method: paracentesis, division of adhesions of the hammer, tenotomy of the tensor tendon, extraction of the hammer and anvil, curetting of the attic and antrum, resection of the membranous canal, and resection of the outer wall of the attic. There never were any inflammatory symptoms in the canal after this method.

WANNER.

201. SEIFERT. *On alypin.*

The author has employed a 10% alypin solution as an anæsthetic and as a substitute for cocain in a large number of small operations on the nose, throat, and larynx. The anæsthetic action is about the same as in a 10% solution of cocain, with the following advantages: 1. It can be made sterile by short boiling without disintegrating. 2. It is very much less poisonous than cocain; and 3. It is cheaper. It should, however, be mentioned that alypin has no vaso-constricting action, which is surely a disadvantage in nasal surgery. A $\frac{1}{2}$ % solution of alypin is also serviceable in Schleich's method.

NOLTENIUS.

202. NEUENBORN. *Ethyl-chlorid narcosis in the treatment of the nose, throat, and ear.*

Narcosis with ethyl chlorid is recommended in short operations, for instance, adenoid vegetations, polypi, furuncles, and paracentesis, on account of the rapid onset of narcosis, the absence of the stage of excitation, the rapid awakening, and the absence of unpleasant side effects.

ZARNIKO.

203. BAUMGARTEN. *Therapeutic experience.*

Protargol. Of no especial advantage in suppurations of the superior maxilla, but valuable in massage of the lower and middle turbinals with a 5% solution in vasomotor and nervous rhinitis. The application of a 5% solution in dry catarrhs of the nasopharynx was also favorable.

Orthoform and Anesthesin. In nervous rhinitis, especially in acute cases after the use of orthoform, the discharge from the nose ceases for several hours.

Adrenalin and Tonogen. The action of these two is rather similar, but the latter is rather cheaper. In operations a little more of the tonogen must be used than of the adrenalin. In nasopharyngeal fibromata, adrenalin is to be preferred. Its constant use seems to exclude the stage of retrogression.

In nervous rhinitis good results have been obtained on using a mixture of orthoform and adrenalin. WANNER.

204. KREIN. *A new apparatus for subcutaneous paraffin injections.*

This is a description of a rather complicated apparatus in which the paraffin is kept fluid in the syringe and needle for a long time and the temperature can be exactly controlled. The syringe consists of two canulæ between which there is some glycerin which will keep a temperature of 55-40° for 20 minutes.

Histological examinations after injections of paraffin are added. The author is opposed to the belief of Hertel that connective tissue is newly formed. The tissue is more apt to be torn and give way; resistant parts such as connective tissue and blood-vessels are included and suffer retrogressive changes.

He also found giant cells grouped about small islands of paraffin. WANNER.

205. BARTEL. *An apparatus for inhalation experiments.*

This is an apparatus by which very finely subdivided drops can be introduced into the lowest air passages. The animals are placed outside of the apparatus and inhale under a normal pressure. WANNER.

206. HARTL and HERRMANN. *On the inhalation of vapors containing bacteria.*

The authors have experimented on guinea-pigs with prodigiosus using an apparatus constructed by Bartel. The counting

of the bacteria showed that the greatest quantity was deposited at the beginning of the air passages, while towards the periphery of the lungs there was a rapid diminution of the inhaled germs. Only a very small part arrived at the margin of the lungs. It could not be determined whether they penetrated into the alveola.

WANNER.

207. SCHILD. *Ethyl-chlorid anæsthesia of the membrana tympani and external auditory canal.*

In minor operations about the ear-canal, Schild uses ethyl-chlorid from a tube, to which a very slender nozzle, about two inches long, is attached at an angle. Evaporation is accelerated by a jet of air blown into the canal. The spray is shut off when the patient complains of an aching sensation.

M. TOEPLITZ.

208. WAGGETT. *A note on skin grafting.*

Before cutting the graft, Waggett applies a proprietary article called "newskin," of the nature of collodion, over the area from which it is to be cut; this forms a varnish and adhering to the graft allows of free manipulation.

ARTHUR CHEATLE.

d.—DEAFMUTISM.

209. FALKOWITSCH. *Examination of the hearing of the inmates in a deaf-mute institution of Wabern in Bern. Inaug.-Dissertation, Bern, 1905.*

210. BRYANT. *Deafmutism and ptomain poisoning. Medical Record, August 19, 1905.*

209. FALKOWITSCH. *Examination of the hearing of the inmates in a deaf-mute institution of Wabern in Bern.*

The inmates of this deaf-mute asylum were examined according to the methods of Bezold. We select the following facts from this interesting paper. The deafmutism was congenital in 16; in 2 it was probably congenital; in 10 the deafmutism was acquired; in 3 cases, unknown. Among the 16 congenital deaf-mutes, 14 gave a history of hereditary taint. One of the children belonged to a deaf-mute mother. Of the 62 ears, 8 were totally deaf. In the remaining 54 there were more or less marked hearing remnants, which are divided into the six groups of Bezold. Agreeing with Bezold and other authors, the writer finds that Group VI., which represented the most marked hearing remnants,

included principally cases of congenital deafmutism. Thirteen ears, or 21 %, were suited for vocal training by the ear.

In the examination with tuning-forks, if we proceed from the area perceived to the hearing limit, more tones are perceived than when the opposite direction is followed. The writer confirms the statement that rotation of most totally deaf does not produce vertigo or nystagmus.

OPPIKOFER.

210. BRYANT, W. S. *Deafmutism and ptomain poisoning.*

Owing to the obscurity of the cases of deafmutism, Bryant feels justified in associating ptomain poisoning, in the case of a girl two and one-half years old, from eating ice-cream, and in another, a girl two and one-half years old, an attack of "fever" with the cause of subsequent deafmutism. He draws an analogy between the affections of the visual and those of the auditory mechanism, and tries to fill the gap in the otological literature by discussing and giving the entire literature on ocular affections due to botulism or ptomain poisoning.

M. TOEPLITZ.

EXTERNAL EAR.

211. CRAMER. *Furuncle of the ear; mastoiditis.* *Wiener klin. Rundschau*, No. 34, 1905.

211. CRAMER. *Furuncle of the ear; mastoiditis.*

Report of a case of furuncle of the auditory canal where the differential diagnosis was particularly difficult because all symptoms of mastoiditis were present. An operation on the mastoid process was decided upon. The auditory canal presented a pronounced swelling caused by two furuncles.

After incising the posterior auditory canal wall, complete recovery took place in a short time.

WANNER.

MIDDLE EAR.

a.—ACUTE OTITIS.

212. HEINE. *On the treatment of acute purulent otitis media with congestive hyperæmia of Bier.* *Berliner klin. Wochenschr.*, 1905, No. 28.

213. SCHUETZ. *Is catheterization indicated or contra-indicated in acute purulent otitis complicated by mastoiditis?* *Inaug.-Dissertation*, Bern, 1905.

214. FORSELLES, ARTHUR A. *The significance of paralysis of the abducens nerve in otitis media.* *Fincha läkaresällsk. handl.*, 1905, p. 136.

215. SPRAGUE. **Scarlatinal otitis.** *Amer. Journ. Med. Science*, Sept., 1905.

216. SHEPPARD. **Otitis media mucosa.** *Ann. Otol., Rhin., and Laryng.*, June, 1905.

217. KERLEY. **Symptomatology of acute otitis in children.** *N. Y. Med. Journ. and Phila. Med. Journ.*, July 8, 1905.

212. HEINE. *On the treatment of acute purulent otitis media with congestive hyperæmia of Bier.*

This is the paper which Heine read at the last meeting of the German Otological Society.

MUELLER.

213. SCHUETZ. *Is catheterization indicated or contra-indicated in acute purulent otitis complicated by mastoiditis?*

The author injected $\frac{1}{4}$ -1 cm into the middle ears of cadavers. The fluids used were methylene-blue, blue-stained glycerin, pus from a purulent empyema. Then he catheterized, and finally opened the mastoid process in order to determine whether the fluid had penetrated the mastoid cells or not. He was able to observe that in presence of small perforations in the drum, the colored fluid was forced by the catheter into the mastoid cells. If, however, the perforation was large, then the mastoid process remained free and the fluid escaped by the auditory canal.

In eight other cases he injected the same fluids, but did not catheterize. In only one case the fluid attained the mastoid process. In the other seven the mastoid process was free from fluid. In other words, not by the pressure of the injection but by the catheterization was the colored fluid forced into the mastoid process in the eighteen cases with a small perforation.

From these experiments the author concludes that the air douche should not be employed in acute purulent otitis when the perforation is small, but if the perforation is large it can be used without danger. In other words, in the great majority of cases of acute otitis air douches are contra-indicated. We do not think that these deductions can be drawn from the above-mentioned experiments. The results obtained from an anæmic and deaf mucous membrane, as is found in cadavers, are not applicable to the conditions when the mucous membrane is inflamed and swollen. Moreover, even if we admit that the discharge found in the swollen mucous membrane in the antrum is produced by the catheterization, the proof is not given that the mastoiditis occurring during the course of an acute purulent otitis is the

result of a catheterization. For we have to deal in the case of living patients with different and important factors: with unusually developed pneumatic cells and large terminal cells, unfavorable drainage, increasing virulence of the bacteria, bodily over-exertion, and other unfavorable conditions of the patient with a weakened general system.

OPPIKOFER.

214. FORSELLES. *The significance of paralysis of the abducens nerve in otitis media.*

A boy eleven years of age suffered from a left-sided purulent otitis with severe headache after an influenza, but without any mastoid symptoms. Shortly after an abducens paralysis appeared. On operating, some pus was found in the cells. As the pain continued, the middle cranial fossa was exposed, but nothing abnormal was found. Complete recovery followed.

JOERGEN MOELLER.

215. SPRAGUE, F. B. *Scarlatinal otitis.*

Sprague found, among 60 cases of scarlet fever in the Rhode Island Hospital, 7 cases of suppurative otitis media developed during the disease, and 3 in active progress when admitted; 7 bilateral and 3 unilateral. Three of the first 7 had no pain, but a sudden rise of temperature as the only sign. Of the 17 suppurating ears, 2 went on to suppuration and necrosis of the mastoid, in 1 with a severe general infection the ear continued to discharge at intervals. Four cases healed well after paracentesis, and in one severe case with nephritis the drumhead and ossicles sloughed away. In the four cases with paracentesis the discharge contained streptococcus in pure culture, but showed a mixed culture within a week. One which had also a diphtheria-like bacillus healed the quickest. In cases with the double infection, diphtheria and scarlet fever, the Klebs-Loeffler bacillus was not found. Clinically, there are three forms of scarlatinal otitis: 1, acute serous otitis, occurring in a mild form at the beginning of the attack; 2, acute suppurative inflammation occurring somewhat later in the course of scarlet fever and depending upon the severity of the general infection; 3, acute necrotic inflammation, the malignant form, leading to destruction of middle-ear labyrinth and even to meningitis. According to experience at the hospital, three children with scarlet fever representing three different families had been quarantined, and each

child returned home with suppurating ears. Within ten days after their discharge from the hospital one other child from each family was admitted with scarlet fever. These cases were started by coming in contact with the discharge from the ears of the first three children. Cases of scarlatinal otitis with continuing otorrhœa should be detained in an intermediate station and kept away from other children at least two weeks after desquamation is complete.

M. TOEPLITZ.

216. SHEPPARD, J. E. *Otitis media mucosa.*

SHEPPARD describes eighteen cases, eleven unilateral and seven bilateral. Etiological factors have been: cold in the head nine times, nasal polypi twice, vasomotor rhinitis once, hypertrophied third and fifth tonsils once, hypertrophied fifth tonsil once, blowing the nose too hard once, "catarrh" once, nasal douche once, use of atomizer once, washing hair once, no evident cause three times. Symptomatology: deafness 25, tinnitus 16, autophonia 4, retraction 17, bulging 1, light reflex wanted 11, Eustachian tube narrowed 10, and appearance of fluid through the membrana tympani 9 times. The membrana tympani was not incised in 6, once incised in 6, twice in 4, three times in 3; five, seven, eight, twelve, eighteen, twenty-three times in 1 case. A striking feature of these cases is their proneness to intercurrent acute attacks of middle-ear inflammation.

M. TOEPLITZ.

217. KERLEY, C. G. *Symptomatology of acute otitis in children.*

In seventy-one cases of acute otitis in infants and young children one symptom only was present in all: an elevation of the temperature above the normal. The otitis was primary in three. One case was associated with German measles, in two scarlet fever, in seven measles, and in fifty-eight gripe or catarrhal colds were the cause. With but a few exceptions the otitis developed during the convalescence of an acute process elsewhere, and the ear involvement was suspected, because of a persistent elevation of the temperature, for which no other cause could be discovered. There was absence of pain in 50 cases, and among the remaining 21 pain or discomfort was recorded.

M. TOEPLITZ.

b.—CHRONIC PURULENT OTITIS.

218. NEUMANN. **An antiseptic treatment of middle-ear suppurations.** *Wiener med. Presse*, No. xlv., 1904.

219. KUTVIRT. **Airol as an aid to diagnosis of carious otitis.** *Wiener klin. Rundschau*, No. xlv., 1904.

220. POLITZER. **Changes in the labyrinth in chronic purulent otitis.** *A. f. O.*, vol. lxx., p. 161.
221. KÜMMEL. **On infectious labyrinthitis.** *Zeitschr. f. klin. Med.*, vol. lv.
222. SELLO. **On the correction of defects in the petrous bone with paraffin.** *Wiener klin.-therapeutische Wochenschr.*, No. xxii., 1905.
223. HAHN and SACERDOTE. **Plasma cells in aural polypi.** *A. f. O.*, vol. lxx., p. 300.
218. NEUMANN. *An antiseptic treatment of middle-ear suppurations.*

After reviewing the literature on the treatment with hydrogen peroxid and its action on bacteria, the following new procedure is described :

The action of hydrogen peroxid is increased by mixing it with permanganate of potash, whereby a gradual and progressive liberation of oxygen occurs and aërobic micro-organisms are destroyed. Pus is readily coagulated by permanganate of potash solution (1:1000); if hydrogen peroxid be added, vesicles appear in the pus corpuscles, which enlarge and cause the pus cells to rise to the surface in clouds.

The experiments were made on specimens where the roof of the tympanum and antrum had been removed and the cavities were filled with a mass of epidermis. The space was then closed with paraffin.

On instilling the solution, the mass was forced into the auditory canal through a perforation of the drum.

For cholesteatoma Neumann employs an ethereal and alcoholic solution of permanganate of potash.

The accompanying drawing illustrates a glass balloon devised by Frey, to which is attached an aspirating appliance. The fluid can be aspirated into the balloon, but, on the other hand, it is possible to collect the aspirated fluid in the glass vessels.

WANNER.

219. KUTVIRT. *Airol as an aid to the diagnosis of carious otitis.*

The observation that airol gauze in cases of chronic foetid suppurations, especially when the attack is involved, turns black at the place of perforation, induced the author to undertake bacteriological examinations, with the following results :

1. Airol turns black from the action of certain bacteria which are found in otitis media.
2. In the presence of bone these bacteria produce hydrogen sulphid.

3. This does not take place in media free from albumen.
4. Dermatol resembles airol but to a much less extent.
5. This is not an iodine or tannin reaction, because other gauzes do not change their color when they are exposed to the action of these cultures.
6. It is a reaction of bismuth on hydrogen sulphid causing the generation of a black bismuth sulphid. WANNER.

220. POLITZER. *Changes in the labyrinth in chronic purulent otitis.*

Nine cases were examined histologically. The changes are described collectively which are found in the labyrinth capsule, in the windows, in the labyrinth cavity, and in the auditory nerves. As to the diagnosis of secondary labyrinthine suppurations, except in the cases of exfoliation of the cochlea or a part of the labyrinth, we are seldom able to make the diagnosis before operation, because even in extensive changes in the labyrinth the characteristic subjective symptoms and objective conditions are absent. Politzer considers examination with a tuning-fork, and especially Schwabach's experiment, as of more value in diagnosis than the so-called labyrinth symptoms, vertigo, nystagmus, vomiting, and subjective ear noises which are often absent. The exposure of the labyrinth suppurations frequently takes place only at the time of the radical operation of the middle-ear suppuration. A fistula is found in the horizontal canal, the promontory wall is carious, or there is a perforation through one of the labyrinth windows. Prognosis depends upon the kind of disease, the condition of the patient, and the localization of the labyrinth disease. In this connection fistulæ of the horizontal semicircular canal were frequently found at radical operations, and these give the best results, while suppurations in the cochlea are most unfavorable on account of their tendency to perforate into the internal auditory canal. This means that when we find a fistula of the semicircular canal we do not necessarily have to invade the labyrinth unless threatening symptoms are present, or the presence of pus suggests extended disease of the labyrinth. In necrosis and perforation of the promontory, if threatening symptoms are absent, it is sufficient to remove the promontory wall and to produce a large opening into the labyrinth without invading the labyrinth itself. If, however, the symptoms are severe, headache, fever, vomiting, an extension

of the suppuration to the posterior cranial fossa or to the internal auditory canal, and when a functional examination shows total deafness, then in cases of labyrinth caries the labyrinth cavity must be exposed either by the well-known method of removal of the posterior horizontal semicircular canal to expose the vestibule, or after the method suggested by Neumann, by which the internal auditory canal is also exposed and which is consequently regarded by the author as practically valuable. HAENEL.

221. KÜMMEL. *On infectious labyrinthitis.*

The treatment of the infectious diseases of the labyrinth has progressed greatly in the last years, though the diagnosis of labyrinth suppurations and especially of the insidious forms is far from perfected. These latent cases are sometimes extremely dangerous. It is, therefore, desirable to examine patients with labyrinth symptoms for changes of function to see in what way they aid diagnosis.

The following 8 cases are reported with this object in view.

CASE 1. A girl nineteen years of age, with chronic purulent otitis. Whisper, right 8*m*, left 20*m*. Before operation no symptoms of labyrinth complication. After operation severe vertigo, nystagmus on looking to the left, which diminished after a few days. Two months after operation a sequestrum of the semicircular canal is discharged. The course of healing was unusually tedious and prolonged. The oval window was later found exposed.

About half a year after the operation the patient is in good health, occasional frontal headache, some tinnitus. The gait with eyes open is undisturbed; with eyes closed, slight tendency to turn to the right. Nystagmus on looking to the left. Hearing, left normal, right whisper .05*m*. Right lower limit d' , upper limit 14,000, heard as well when the right ear is closed. The vestibule can be explored with a fine probe.

CASE 2. Female. Acute otitis media and mastoiditis after operation on the nose. No labyrinth symptoms before operation. At operation the horizontal semicircular canal is opened at one small area. On recovering from the anæsthesia, severe rotatory vertigo, marked horizontal nystagmus on looking to the left. The patient lies on the diseased side. The vertigo is slight. Every movement of the head towards the affected side causes a renewed attack of vertigo. No fever. Gradual diminution of

these symptoms. Normal healing. After $\frac{1}{4}$ year the attacks of vertigo persist, especially after bodily exertion. One year later slight unsteadiness, especially after quick turns. Five months later no change. Standing with closed eyes is not possible. According to Bezold, absolute deafness on the right side.

CASE 3. Twenty-two-year-old girl. In the course of an influenza-otitis, right sudden severe attacks of vertigo and vomiting. The patient could no longer stand alone. The radical operation showed that the oval window was exposed, the stapes absent, and fistula with granulations present in the horizontal semicircular canal. The vestibule was exposed from the horizontal canal, and from the oval window. The labyrinth symptoms disappeared rapidly. The wound healed normally, except for the region in the semicircular canal. Complete healing in one year. Then the lower tone limit was found at F sharp. Apparent deafness on the diseased side. Dizziness only on looking downward into a depth, but more severe than before the illness.

CASE 4. Seventeen-year-old girl. Occasional suppurations since childhood on the right side, which have been continuous for half a year. Swelling appeared two weeks ago behind the ear. The mother died from consumption. On admission numerous glandular swellings. On the right side, paralysis of the facial nerve. No vertigo, no disturbance of equilibrium, and no nystagnus. Moist râles over both apices. On May 31st, radical operation. A large cavity filled with granulations exposed. Tubercle bacilli found in the granulations. One month later granulations removed from the cavity. A large sequestrum, including the greater part of the cochlea, the oval window, the superior and posterior semicircular canals, and a part of the external canal, was removed. No vertigo after operation. A small sequestrum expelled later. On dismissal, October 5th, the cavity of the sequestrum is healed. The rest of the wound is still granulating. Deafness on the right side.

CASE 5. A girl eleven years old. Chronic purulent otitis. Fever one week up to 40° C. On admission the patient is very ill, with rigidity of the neck. July 27, 1903, operation. Cholesteatoma. Dura in the region of the tegmen of the antrum exposed. It was found discolored green. There was no fistula. Facial canal eroded. Oval window opened. Probe enters into vestibule. This is broadly exposed. Dura over the tegmen of the tympanum is incised. The pia is thickened and clouded. No

escape of liquor. Puncture of the brain negative. After operation pronounced nystagmus, unconsciousness in the evening, complete facial paralysis, rigidity of the neck, opisthotonos. Temperature 38° , pulse 96, irregular. Vomiting. The cerebellar symptoms continued until July 24th. Then they improved. On a recurrence of the rigidity of the neck and a general aggravation, the cavity and the labyrinth fistula were curetted on August 7th. The dura was again incised over the region of the temporal lobe. About two teaspoonfuls of a milky, cloudy fluid evacuated, mixed with necrotic particles of tissue and flocculi. The cortex over the tegmen of the antrum softened to a depth of $1\frac{1}{2}$ cm. Drainage tube introduced. After operation sensorium clear, rigidity of the neck less. Then gradual convalescence. In January, 1904, the facial paralysis is still present. The wound cavity is closed.

CASE 6. Male eighteen years old. Chronic otitis on the left side. Vertigo on turning to the right, for eight days. Headache, fever, chills, marked Romberg. Temperature 37.4° , rigidity of the neck, Kernig's sign. Rotatory nystagmus on looking to the right. Sensorium clear. March 4, 1903, at operation there was a large cavity filled with broken-down purulent material. The tegmen of the tympanum partly destroyed. Extradural abscess of the middle cranial fossa, which was broadly exposed. There is a fistula of the semicircular canal and defect of the stapes. The fistula is opened. The exposed dura is incised, no spinal fluid escapes. Recovery uneventful. Suppuration from the vestibule continues for some time.

CASE 7. A man, thirty-eight years of age. Right otitis since childhood, vertigo for some time, facial paralysis for one day. July 25, 1904, at operation the oval window was found exposed, and there was a fistula of the semicircular canal. The vestibule lay bare. After operation the vertigo was permanently cured. Recovery uneventful.

CASE 8. A man forty-two years of age. Chronic left suppuration since childhood. May, 1904, vertigo, vomiting, marked pain in the ear. On August 8, 1904, operation. Cholesteatoma; four small sequestra, which represented parts of the semicircular canals; a large fistula in anterior semicircular canal; no stapes. Three days after operation frequent vomiting, then undisturbed convalescence. Wound healing at the time of publication not completed. Some uncertainty on walking and standing.

The result of a careful examination of the labyrinth function of all of these patients can be briefly recapitulated.

1.—*Acoustic Function.*

In Case 1, before operation, the hearing was still good. After the intervention it gradually diminished, and six months later total deafness was present. It could not be determined whether the labyrinth disease existed before the operation (the good hearing on the side of the labyrinth disease would have then been remarkable) or whether it developed after operation. In all of the other cases the deafness was caused by the labyrinth suppuration.

2.—*Static Function.*

This was carefully examined according to the rules laid down by von Stein. The results are chiefly the following :

1. Static muscular activity.

(a) Standing on both feet was easily performed by all patients as long as the eyes remained open, and the changes were not recent. The author assumes that shortly after the onset of the disease disturbances can be observed. On standing with closed eyes, many patients showed a tendency to sway in various directions in an antero-posterior or diagonal direction, or the body would describe a wedge shape. The author believes that the Romberg phenomenon after labyrinth disease differs from that of other causes by the rapidity of its onset after closure of the eyes and its rapid disappearance after opening the eyes. The swaying was increased if the patient stood on his toes.

(b) Standing on one leg. It had not thus far been determined whether disturbances of equilibrium in those suffering from tabes are more pronounced if the patient stands on one or the other leg. This has occasionally been observed in patients with labyrinth suppuration, a fact to which Stein has lately called our attention. Of the author's patients this was distinctly present in two cases ; in four, however, there was no difference. If there is a difference, the preservation of equilibrium is more disturbed on standing on the leg corresponding to the diseased side.

(c). Standing on an inclined plane, examined by means of the goniometer. In this examination it was found that there was no characteristic difference between healthy persons and those with

diseased labyrinths, though the figures are too small to give definite results.

2. Dynamic muscular activity. In severe acute disturbances, walking even with support is impossible. This gradually disappears, and even when one labyrinth is completely destroyed the ability to walk is restored. Functional disturbances after a defect in both labyrinths are not well understood. The author's patients, after acute symptoms had disappeared, showed unsteadiness or slight swaying towards one side on walking straight ahead or backwards, often more pronounced when the eyes were closed, and on jumping on both legs or on one leg.

3. Nystagmus was absent only in Case 4. In the other patients it was present at least temporarily. It was either horizontal or rotatory. The frequency and extent of the individual excursions varied. It was present in all patients only on turning the eyes to the healthy side. This condition was sometimes accentuated by operation. Passive rotation from the healthy to the diseased side increases the nystagmus, rarely leaves it uninfluenced. Rotation in an opposite direction gives varying results. Examination by means of the dynamometer and the galvano-current was also uncertain.

Finally the author confesses that the results of these examinations are far from perfect.

A diagram is added showing the course of the examination of each person suspected of labyrinth disease, as it is in force in the Heidelberg Clinic. This can surely be warmly recommended, and thus the danger of forgetting anything in the examination can perhaps be avoided.

HINSBERG.

222. SELLO. *On the correction of defects in the petrous bone with paraffin.*

A collective review of the cases reported in literature, presenting nothing of interest for the specialist.

WANNER.

223. HAHN and SACERDOTE. *Plasma cells in aural polypi.*

The examination of twenty aural polypi revealed the constant presence of typical plasma cells in the connective-tissue spaces in numbers exceeding all other cellular elements. They were not present in the mucous membrane, nor in the drum membrane, tympanum, or tube. It seems, therefore, that there are products of chronic inflammation which are not tuberculous,

actinomycotic, or syphilitic, and in which the plasma cell is the preponderating element. HAENEL.

c.—CEREBRAL COMPLICATIONS.

224. FORSELLES. On otitic consecutive diseases. *Fincha läkaresällsk. handl.*, 1905, p. 203.

225. CHAVASSE and TOUBERT. On temporal and endocranial complications of otitic origin. *Arch. internat. d'otol.*, etc., vol. xx., p. 86.

226. MYGIND. A case of otitic cerebral abscess with aphasia healed by operation. *A. f. O.*, vol. lxx., p. 279.

227. STEINHAUS. Pseudo-diphtheria bacteria the cause of a brain abscess. *Münchener med. Wochenschr.*, No. 37, 1905.

228. KNOCHENSTIERN. On otitic serous meningitis. *St. Petersburg med. Wochenschr.*, No. 30, 1905.

229. ALEXANDER. On the surgical treatment of otitic meningitis. *Deutsche med. Wochenschr.*, No. 39, 1905.

230. VOSS. The curability of otitic purulent meningitis, with particular regard to the diagnostic and therapeutic importance of lumbar puncture. *Charité Annalen*, 29. Jahrgang.

231. UFFENORDE. A case of middle-ear suppuration. *Deutsche med. Wochenschr.*, No. 36, 1905.

232. JACK. Symptomatology, diagnosis, and treatment of encephalitis and brain abscess. *The Laryngoscope*, July, 1905.

233. DENCH. Two fatal cases of brain abscess. *Amer. Journ. Med. Sciences*, August, 1905.

234. MCKERNON. Primary jugular-bulb thrombosis in children as a complication of acute purulent otitis media, with a report of cases. *N. Y. Med. Journ.*, July 1, 1905.

235. JACK. Operation for cerebral abscess. *Boston Med. and Surg. Journ.*, July 20, 1905.

236. AMBERG. The relative position of a forward lateral sinus, and its bearing on the choice of method for the total opening of the middle-ear cavities. *N. Y. Med. Journ. and Phil. Med. Journ.*, Sept. 9, 1905.

224. FORSELLES. *On otitic consecutive diseases.*

Since 1900 the author has observed 14 cases of endocranial complications, consisting of 2 brain abscesses, 1 extradural abscess, 7 cases of pyæmia or sinus thrombosis, and 4 cases of meningitis.

The first case of brain abscess is remarkable because amnesic aphasia was present, although the condition was situated on the right side and the patient was right-handed. In the case of an extradural abscess, the process in the tympanum had healed when an abscess appeared behind the ear, which led to operation. In the treatment of sinus thrombosis the author is inclined to

ligate the jugular vein doubly, and to divide it. In one case the complicating thrombosis was presumably caused by exposing the sinus at operation. The author, therefore, believes that in these cases the retro-auricular opening should not be closed. In cases of meningitis the author recommends eradication of the primary focus and then exposure of the cranial cavity. MOELLER.

225. CHAVASSE and TOUBERT. *On temporal and endocranial complications of otitic origin.*

These authors have operated on 91 patients, chiefly soldiers, during the past seven years on account of mastoiditis, and in this report they give a description of the symptoms and the course of the disease. In 74 cases the mastoiditis was uncomplicated; in 5 there was thrombo-phlebitis, in 3 otitic pyæmia without sinus phlebitis, in 4 an extradural abscess, in 2 meningitis, in 2 abscess of the temporal lobe; in 1 patient there was a cerebral abscess. In the last case pus had travelled from the labyrinth along the aqueduct of the vestibule. In the 2 abscesses of the temporal lobe there was a defect in the roof of the tympanum, and in 1 case in addition an extradural abscess; 56 patients were operated on in cocain narcosis (using up to 3 grams of a 1 % solution).

OPPIKOFER.

226. MYGIND. *A case of otitic cerebral abscess, with aphasia healed by operation.*

This case is of interest because the usual erosion of bone down to the cranial cavity was present, but there was no direct evidence of inflammation in the dura mater observable to the naked eye. The dura was not adherent to the diseased brain. The changes in the brain were most pronounced at about 1 cm from the cortex, and presented the picture of a hemorrhagic encephalitis, with beginning central suppuration. The focus was situated in the third temporal convolution, so that the sensory aphasia must be regarded as an example of distant action.

HAENEL.

227. STEINHAUS. *Pseudo-diphtheria bacteria the cause of a brain abscess.*

In an abscess of the temporal lobe produced by a chronic purulent otitis, and successfully operated upon, the pseudo-diphtheria bacillus was found. As this was the only organism which grew on the agar plate, the author believes that it has been the communicative factor.

SCHEIBE.

228. KNOCHENSTIERN. *On otitic serous meningitis.*

According to Quincke, serous meningitis is a simple non-parasitic inflammation of the cerebral pial vessels which leads to exudation and increase of the cerebro-spinal fluid. To the few straightforward cases quoted in literature the following is added: A patient, fifteen years of age, had suffered for nine years from left-sided otorrhœa after scarlet fever. In the beginning of July, 1903, gradually various psychic symptoms set in—a feeling of dread, insomnia, delusions, pain diminished over the entire body, hyperæsthesia in the abdominal region, choked disk, and diminished sense of taste. August 4, 1903, the radical operation was performed. As very little was found wrong at operation, the dura over the temporal lobe was incised. The cerebrum was explored with a scalpel without encountering an abscess.

After the outlet of a large quantity of cerebro-spinal fluid, all the symptoms disappeared, and the patient recovered. No relapse up to April, 1905.

SACHER.

229. ALEXANDER. *On the surgical treatment of otitic meningitis.*

Alexander divides meningitis into three groups, purulent, tuberculous, and serous, with the explanation that these main divisions cannot be sharply separated, and that a serous meningitis may be the forerunner of a purulent or tuberculous lesion with an intervening interval of weeks or even months. Purulent meningitis may appear as a circumscribed or diffuse external or internal pachymeningitis or pachy-leptomeningitis, or true leptomeningitis. In the acute purulent meningitis the kind and virulence of the micro-organism are decisive. Tuberculous meningitis is not amenable to operation, in the early stages, because the symptoms are not characteristic, and in the final stage, because the disease is then too well pronounced and other tuberculous foci are present. In the last years a number of cases of diffuse purulent meningitis have been reported which were healed by operation.

The operative treatment of serous meningitis is much more favorable; many favorable reports have been published. Diagnostically, lumbar puncture is very important, though therapeutically its value is very slight. In any case, a clouded lumbar fluid does not furnish a contra-indication to operation, and in every case the attempt should be made to eradicate as completely as possible the purulent focus, with drainage of the intradural space. The operation should not be undertaken only

when the general condition is very poor. The value of removing superficial diseased parts of the brain must be decided by further experience.

NOLTENIUS.

230. Voss. *The curability of otitic purulent meningitis, with particular regard to the diagnostic and therapeutic importance of lumbar puncture.*

This paper treats a question which at present engages the interest of otologists, namely, the curability of otitic meningitis.

In the introduction, the unquestioned recoveries in epidemic, traumatic, and tuberculous meningitis are given. Then the published cases of healed otitic meningitis are reviewed, both the circumscribed and the diffuse varieties.

The author was able to observe a number of pertinent cases in the Charité.

CASE 1. A man, thirty-three years of age, could not give any information about the onset of his ear trouble. On September 9, 1901, while at work, he was taken ill with vomiting, vertigo, and headache. One week later he was admitted to the hospital, presenting the picture of a pronounced meningitis (stupor, rigidity of the neck and back, loud cries, congestion of the optic disks, etc.). These symptoms all disappeared on October 18th without an operation having been performed. Ten days later a radical operation was performed. Granulations were found in the attic, in the antrum, and in the middle ear. After the operation the vertigo gradually disappeared. In the beginning of January, 1902, transient paresis of the ocular branch of the right facial nerve. The suppuration in the depth of the wound continues. On the 10th of January, 1902, a severe attack of vertigo. During the dressing a sequestrum of the cochlea removed. Then gradual undisturbed recovery.

After a critical review of the clinical symptoms, the author concludes that this was a case of diffuse labyrinthine meningitis which recovered without operation (lumbar puncture negative).

CASE 2. A man, twenty-four years of age, had suffered from a running left ear for fourteen days. On admission, September 22, 1902, temperature 38°, pulse 72. Pronounced nystagmus, on looking to the right. In the left auditory canal there were granulations and pus. The mastoid process was tender. Operation at first refused. On September 24th, temperature 39°, pain in the neck, slight stupor, Kernig's contracture, venous hyperæmia in the fundus. September 25th, marked headache,

temperature 38.2° , pulse 70. The lumbar fluid was cloudy, containing numerous mononuclear leucocytes, individual diplococci, and long rods. September 25th, radical operation. The bone sclerosed; granulations in the middle ear and in the mastoid process. Temperature 40.3° , pulse 100. Restless at night. September 26th, temperature 38° , no headache, some pain in the neck. Up to November 22d, mild meningeal symptoms of varying intensity. In this period eleven additional lumbar punctures were performed. The fluid was always clouded and contained bacteria. Puncture was always followed by headache, which disappeared on the following day. Gradual improvement. On November 27th the final meningeal symptoms had disappeared. On December 12th a sequestrum was removed, which contained the three semicircular canals and a part of the vestibule. On January 9th the wound was almost entirely healed.

In the author's opinion it is undecided whether the favorable result in this case depended upon the mild virulence of the ineffective agents or on the probable localization of the suppuration at the posterior cranial fossa.

CASE 3. A girl, six and one-half years old, suffered from scarlet fever in her fifth year, followed by purulent otitis. Pain in the ear during the last five weeks, with headache, intermittent fever, convulsions in the right arm and leg, vomiting during the past five days. On admission, April 19, 1904, the sensorium was free. There was slight somnolence. Temperature 38.6° , pulse 34, moderate rigidity of the neck, slight Kernig's contracture. Lumbar puncture immediately performed, liquor under high pressure clouded with flocculi containing pus corpuscles, rods, and diplococci. Radical operation April 19th. There was a large cavity in the mastoid process and a small cholesteatoma in the antrum. Extradural abscess in the posterior cranial fossa. The sinus contained a thrombus 2cm long. The jugular vein was ligated. After operation, marked hyperæsthesia of the extremities. April 21st, second lumbar puncture. The lumbar fluid was cloudy and contained rods. April 24th, opisthotonos, headache, sensorium free. April 26th, sensorium cloudy. April 28th, marked opisthotonos, retraction of the abdomen; death.

At autopsy, pus was found in the posterior cranial fossa, extending downwards and backwards from the sella turcica. The meninges seemed otherwise free from pus. The difference in the course of this disease from that of the preceding one, though

the localization was the same, probably depended upon a difference in the inciting agent.

As regards the influence of the particular pyogenic organism on the course of the meningitis, in fifteen healed cases six, that is 40%, gave diplococci in pure culture, in two cases associated with other bacteria, three times with staphylococci, once with rods, and three times with cocci which were regarded as streptococci. The proof that a streptococcus meningitis can be cured has not been furnished. The previous experience shows that a pneumococcus meningitis gives probably the most favorable prognosis. (In a series of healed cases, which the reviewer recently published in this journal, staphylococci preponderated.)

The diagnostic importance of lumbar puncture is fully treated. Formerly a macroscopic cloudiness of the lumbar fluid was regarded as characteristic for meningitis. The experience of recent years has, however, shown that this is not correct, as in cases of uncomplicated brain abscess, sinus thrombosis, hydrops, etc., cloudiness is also present. This is also illustrated by a case observed by Voss.

CASE 4. A man, sixteen years of age, with marked variation in temperature, without meningeal symptoms, jaundice. In the clouded lumbar puncture fluid there were almost exclusively mononuclear leucocytes. The culture was sterile. Recovery.

According to Voss the preponderance of mononuclear leucocytes is suggestive of a mild meningeal inflammation, while the polynuclear leucocytes are more frequent in the intense forms.

The presence of bacteria in the liquor does not necessarily mean meningitis, because they have been found in the lumbar fluid in septic processes, when the meninges were normal. (Cases of Von Stadelmann, Pfaundler, and others, Cases 5 and 6 of Voss.) These were principally cases of infection of the liquor by the circulation.

According to Voss, bacteria under certain conditions are also found present in serous meningitis. (Case 7.) This would then be an analogon to serous pleurisy, in which the same organisms have been found as occur in the purulent variety. Presumably these are also the virulent forms.

CASES 8 (general infection) and 9 (cerebellar abscess) show the impossibility of a certain diagnosis from lumbar puncture.

The result of this examination should not influence us in our treatment. We are not justified in regarding a case as hopeless

from the result of the lumbar puncture and refusing to operate. That the negative result of lumbar puncture does not always furnish us with certain facts, is shown by Case 10.

As regards the therapeutic value of puncture the author is very careful in drawing any conclusion. Case 1, where the meningitis was recovered from without any operation, and Case 2, where the lumbar puncture was performed twelve times, do not permit a decision as to the value of this procedure. In a footnote, added after the paper had gone to press, there is a report of an unquestioned successful result of puncture. The possibility of an unfavorable influence is furnished by Case 11.

The question whether we should attempt to attack meningitis in a different manner is still unsettled. (Incision of the dura, aspiration of the liquor with a syringe according to Manasse, or laminectomy after Friedrich.)

The paper contains many interesting facts. Moreover, an excellent bibliography is added.

HINSBERG.

231. UFFENORDE. *A case of middle-ear suppuration.*

This is a report of a patient, twenty years of age, who had suffered from relapsing aural suppuration, with cholesteatoma. At operation a large extradural abscess was found as a complication. On a second operation, eight days later, extensive sinus thrombosis going into the bulb was discovered. This was exposed, according to Grunert's method, and it was possible to remove the thrombus without causing additional injuries. The case recovered, though for a time a pulmonary metastasis seemed threatening.

NOLTENIUS.

232. JACK, F. L. *Symptomatology, diagnosis, and treatment of encephalitis and brain abscess.*

Among forty-three cases of encephalitis, thirty-two occurred between ten and thirty, and eleven between thirty and sixty years of age. Jack's case, showing the possibilities of operation even upon a moribund patient, was a man twenty-five years old, with a chronic suppuration from the left ear, and with frontal headache during the last six weeks. Swelling in the canal and mastoid tenderness gradually disappeared. Temperature fell from 101° to 99°; pulse, 60 to 70. Seven days after paracentesis, chill, frontal headache. Temperature 102°, pulse 100. Extradural operation. The antrum was filled with pus; above and posteriorly, softened bone and pus. Bone was removed

from the middle fossa 1 : 1½". The lateral sinus was exposed. Dura and sinus were normal. Cholesteatoma in the middle ear. Mixed infection. On following day, temperature 100°, pulse 80. Frontal headache continued. On eighth day after operation, patient picked at the bedclothes and could not be roused. Temperature 98 ; pulse 102, thin, wiry. Convulsions in hands and arms. Temperature 103°, pulse 60. Deep coma, profuse perspiration, involuntary urination. Intradural operation : wound enlarged by incision upwards over the squamous bone and posteriorly for about two inches toward the occipital protuberance. A large surface of the middle cranial fossa was exposed. Four ounces of foul pus and sloughing brain tissue were evacuated from the brain. Fundus of the right eye showed slight swelling at the disk and tortuosity of veins, the left eye marked swelling and tortuosity. Paralysis of left abducens; aphasia, unable to name a subject. Seven days after operation, imperfect drainage; the cavity was enlarged with blunt scissors and two ounces of very foul pus were discharged. Aphasia continued. Uninterrupted recovery.

M. TOEPLITZ.

233. DENCH, E. B. *Two fatal cases of brain abscess.*

CASE 1. A man, aged fifty-two years, had an acute middle-ear inflammation with probable involvement of the mastoid at the time of the acute invasion and with apparent subsidence of all mastoid symptoms, but with some staggering gait. On admission he was in great pain, restless, or drowsy ; septic appearance of the face, foul breath, coated tongue. Semi-conscious state, but easily aroused. Right external auditory meatus narrowed, bulging of drum ; myringotomy. Unidentified bacillus in the discharge. Exploratory mastoid operation revealed extensive destruction. Mastoid pus showed mixed infection. After mastoid operation patient was more stupid ; some paralysis of left upper arm. Craniotomy 1¼" above, 1¼" behind the centre of the external auditory meatus. Upon incision into the brain an ounce of pus evacuated. Improvement for four days, then impairment. Death on the tenth day after operation with symptoms of meningitis.

CASE 2. A young man, aged twenty-one years, had constant purulent discharge from the left ear for two years. Radical operation. After secondary skin grafting, with closure of wound two weeks later, rise of temperature to 105.6° which

subsided to 99.2° after removal of all stitches and cleaning of wound. Three weeks later, the patient became dull, temperature rose slowly, pain in head and back of head, choking of left optic disk, aphasia or rather word blindness, homonymous hemianopsia involving the temporal half of the right eye and the nasal half of the left. Craniotomy. No pus. On third day after operation, small abscess appeared under anterior angle in the soft parts; evacuated. Temperature fell to normal. Ten days after craniotomy, considerable pus from hernia cerebri from two pockets in the brain substance. Hernia became smaller. Steady improvement for eight weeks, when severe pain in the head, chill, coma, temperature to 105.8° , and rigidity of the neck appeared. Meningitis. Brain substance opened over hernia; turbid fluid evacuated, evidently from lateral ventricle. Temperature fell to normal, but soon rose again. Patient died on seventh day after invasion of ventricle. The cranial cavity should be opened in every instance as nearly over the site of the collection of pus as possible. Dench used for exploring the abscesses and introducing drainage a pair of very light retractors passed along the director. The encephaloscope may be introduced between the retractors and these then removed.

M. TOEPLITZ.

234. MCKERNON, J. F. *Primary jugular-bulb thrombosis in children as a complication of acute purulent otitis media, with a report of cases.*

McKernon fully reports six cases of children, with ages ranging from six months to two years and ten months, who aside from an acute purulent otitis presented as the only other symptom of marked importance an unusually rapid rise of temperature from 99° or 100° F. to 104° , 105° , or even 106° F., and quite as sudden as the rise a fall to 97° , 98° , 99° , or possibly 100° . The temperature may remain low for several hours, and then quickly rise again to high points, to be followed by a rapid remission, and this may go on indefinitely to the end. The pulse during exacerbation of temperature is rapid. There is no chill present. In one case was nausea or vomiting. During the remissions the patients feel very well. The bacteriological examination of the discharge revealed streptococcus in five cases and staphylococcus in one case as the predominating infection. The blood-count with polynuclear percentage between 80 and 90, no matter what

the leucocyte count be, is a valuable aid in diagnosis. Four cases recovered after the removal of a clot from the lateral sinus and jugular bulb. The fifth, seventeen months old, died, eighteen days after operation, from cerebellar encephalitis. The sixth, six months old, never regained consciousness after operation, and died after six hours. The jugular was not ligated in any case, since the clots were not disintegrated. M. TOEPLITZ.

235. JACK, F. L. *Operation for cerebral abscess.*

In 14 cases operated upon at the Massachusetts Charitable Eye and Ear Infirmary, and in 9 cases at the Massachusetts General Hospital, 21 were fatal and 2—1 at each—recovered. In the one successful operation, opening through the squamous portion (trephining) was avoided. In the cases of recovery a rubber drainage tube was used. M. TOEPLITZ.

236. AMBERG, E. *The relative position of a forward lateral sinus, and its bearing on the choice of method for the total opening of the middle-ear cavities.*

Among specimens from cadavers, Amberg found a "forward" lateral sinus in twelve instances. While in eleven right specimens the distance from the lateral sinus to the spina suprameatum was between 6 and 9mm, it was in the left temporal bone of one between 4.5 and 2.5mm. The antrum could not have been opened from the mastoid. The foramen mastoideum of the right temporal bone of this specimen was almost as large as the sigmoid groove itself; the outside opening was 5 by 3mm, the opening in the sigmoid groove 6 by 4mm. The mastoid process was somewhat flattened. M. TOEPLITZ.

d.—OTHER MIDDLE-EAR DISEASES.

237. WITTMACK. *On the causes of chronic deafness.* *Wiener klin. Rundschau*, Nos. 31 and 32, 1905

237. WITTMACK. *On the causes of chronic deafness.*

This is a clinical lecture, with nothing new for the specialist.

WANNER.

NERVOUS APPARATUS.

238. HAMMERSCHLAG. *On the diagnosis of the functional diseases of the sound-perceiving apparatus.* *Allgemeine Wiener med. Zeitung*, No. 45, 1904.

239. BOROWIKOW. *A case of disturbance of equilibrium in disease of the semicircular canal.* *Wojenno-Medizinski Shurnal*, May, 1905.

240. ROSENSTEIN. *On syphilitic disease of the auditory nerve.*
A. f. O., vol. lxx., p. 193.

238. HAMMERSCHLAG. *On the diagnosis of the functional diseases of the sound-perceiving apparatus.*

After a review of the disturbances of hearing found in hysterical patients, a number of case-histories are reported: a case of hysteria and a case of traumatic hysteria; a third case is not conclusive, and probably does not rest upon a disease of the inner ear following hysteria.

WANNER.

239. BOROWIKOW. *A case of disturbance of equilibrium in disease of the semicircular canal.*

In this patient the following three symptoms were observed: deafness, diminution of vision, and disturbance of equilibrium. As characteristic for an affection of the semicircular canal there are diminution of hearing, which is in proportion to the disturbance of equilibrium, depression, and, in severe cases, complete absence of the sensation of vertigo, absence of nystagmus on active and passive rotation, and partly a diminution of the sensation of rotation. The last symptoms are best elicited on rotating the patient on the centrifuge, which must be regarded as a valuable aid in diagnosis.

SACHER.

240. ROSENSTEIN. *On syphilitic diseases of the auditory nerve.*

A study of literature enabled the author to come to the following conclusions: Syphilitic diseases of the auditory nerve are more frequent than has been supposed, much more frequent than syphilis of the olfactory nerve. Most of the cases occur after basal gummatous meningitis, years after the infection. Diseases from transmitted gummatous processes in the temporal bone or from compression following periostitic stenosis of the internal auditory meatus are unusual. Diseases of the auditory nerve are rare in the early periods of syphilis. In these cases there is usually an independent gummatous neuritis or perineuritis. The nucleus and roots of the auditory nerve become affected simultaneously with the trunk of the nerve. There may be a neuritic disease of the nerve or a simple degenerative process in the nuclear and root region. Deafness and hereditary syphilis may be the cause, by primary inflammation of the labyrinth or by auditory neuritis.

The resistance of the auditory nerve to syphilitic disease is less than that of the facial. Syphilitic disease of the auditory nerve

repeatedly followed degenerative processes in the cochlea. Therefore the slightest disturbance of hearing in the presence of cerebral syphilis requires energetic treatment. HAENEL.

NOSE AND NASO-PHARYNX.

a.—GENERAL PATHOLOGY.

241. BURCHARDT. The passage of air in the nose under pathological conditions. *Arch. f. Laryngol.*, vol. xvii., book i., 1905.

242. PREOBRASHENSKY. On the rôles of the naso-pharynx and larynx in hæmoptysis. Hemorrhagic pharyngitis. *Arch. f. Laryngol.*, vol. xvii., No. 1, 1905.

243. ESCHWEILER. The histological condition of paraffin in living tissues of man. *Arch. f. Laryngol.*, vol. xvii., No. 1, 1905.

244. STEWART. A case of suppuration of the eyelid and supra-orbital region following cauterization of the nasal region. *Lancet*, May 27, 1905.

245. PASTEUR. On pneumococcal sore-throat, with notes of a fatal case. *Lancet*, May 27, 1905.

241. BURCHARDT. *The passage of air in the nose under pathological conditions.*

By means of a plaster model the currents of air in the normal nose were studied, as also in the various anomalies (muscular thickenings, tumors, anomalies of the septum, etc.), and finally the movements of air in the accessory cavities. The results cannot be well given in a short review. The author, however, concludes that destructive operations in the nose, that is, removal of turbinals or large parts of these, cannot be counted among the indifferent operations.

ZARNIKO.

242. PREOBRASHENSKY. *On the rôles of the naso-pharynx and larynx in hæmoptysis. Hemorrhagic pharyngitis.*

The author concludes: 1. Hæmoptysis from the upper respiratory passages occurs more frequently than is supposed. 2. They originate from inflamed areas or simply from dilated blood-vessels. 3. If the diagnosis is correct, they can usually be easily cured. 4. The amount of hemorrhage does not signify one or another organ. If the hemorrhage is profuse the pharyngeal organ is not excluded. 5. The term hemorrhagic pharyngitis should be recognized just as hemorrhagic laryngitis and tracheitis are, on account of the importance of hæmoptysis as a symptom.

ZARNIKO.

243. ESCHWEILER. *The histological condition of paraffin in living tissues of man.*

The author had the opportunity of excising and examining with a microscope a quantity of paraffin which had been injected under the nose of a patient a year ago. He concludes that the paraffin is completely absorbed and replaced by connective tissue. Other details are illustrated by drawings. Therapeutically the author recommends making many small rather than one large area, because then the connective-tissue formation will take place more rapidly.

ZARNIKO.

244. STEWART, W. R. H. *A case of suppuration of the eyelid and supraorbital region following cauterization of the nasal regions.*

A boy aged sixteen years had the right inferior turbinal cauterized and did not take proper care of himself after. Pus formed in the eyelid and supraorbital region a week later.

ARTHUR CHEATLE.

245. PASTEUR, W. *On pneumococcal sore-throat, with notes of a fatal case.*

Pasteur relates the case of a boy, aged three and one-half years, who became suddenly and seriously ill with a sore-throat, death taking place on the twenty-second day.

At first the uvula, soft palate, and faucial pillars were slightly œdematous and intensely red and glazed and both tonsils were somewhat swollen and intensely injected. There was no exudation of any kind. The glands at the angle of the jaw were moderately swollen on both sides and very tender.

Swab cultures yielded abundance of micrococci, but no bacilli.

On the eleventh day the uvula and adjacent parts of the soft palate were brown and sloughing became gangrenous. Bronchopneumonia in the upper and lower lobes of the left lung supervened.

Cultures obtained after death from the pharynx and lungs showed the diplococcus pneumoniae in predominating numbers.

ARTHUR CHEATLE.

b.—OZÆNA.

246. BROECKART. *The newest surgical treatment of rebellious cases of ozæna.* *La presse oto-laryngologique Belge*, 1905, No. 7.

The best results have been obtained by the injection of paraffin, though this sometimes fails when the mucous membrane

has lost its elasticity and the nasal cavity cannot be made smaller, or when the accessory cavities are diseased. The author regards diseases of the accessory cavities as secondary, as opposed to the generally accepted idea. There are cases where the atrophy has not only invaded the turbinates but the entire ethmoid labyrinth, without causing symptoms of purulent accessory sinus disease. Notwithstanding the restoration of the lower turbinate the discharge keeps its ozæna-like nature. In purulent disease of the accessory sinuses he recommends removal of the entire ethmoid. The incision is made according to Moure from the root of the nose to the nares. The skin is retracted, the nasal process and the entire surface of the superior maxilla are exposed. The nasal bone is resected with preservation of the internal margin and the process of the superior maxilla. The ethmoid is then removed with a large curette. The antrum and the sphenoidal cavity are then broadly opened, the mucous membrane is curetted, the wound is packed and sutured. The results in two cases operated on according to this method are satisfactory.

BRANDT.

C.—TUMORS.

247. GLAS. **On the histology and etiology of the so-called bleeding septal polyp.** *Arch. f. Laryngol.*, vol. xvii., No. 1.

248. CHIARI. **On the diagnosis of neoplasms of the maxillary antrum.** *Deutsche med. Wochenschr.*, No. 29, 1905.

249. BROECKART. **Ethmoidal endothelioma.** *Annales de la société de méd. de Gand*, 2 fascicule, 1905.

250. TOEPLITZ and KREUDER. **Rhinoscleroma.** *Amer. Journ. Med. Science*, July, 1905.

251. PHILLIPS. **A case of melanotic sarcoma with manifestations in the nose, naso-pharynx, mouth, and larynx.** *The Laryngoscope*, June, 1905.

252. SMITH. **Primary epithelioma of the uvula.** *N. Y. Med. Journ. and Phila. Med. Journ.*, April 29, 1905.

253. MCCOY. **Adenocarcinoma of the nose. Killian's operation for radical removal.** *The Laryngoscope*, April, 1905.

254. CLARK. **Glioma of the nose. Report of two congenital cases.** *Amer. Journ. Med. Science*, May, 1905.

255. HARLAND. **Papilloma in syphilitic child occluding both nostrils.** *American Medicine*, April 1, 1905.

256. SMITH. **Naso-fibroma treated by injection of monochloroacetic acid.** *The Laryngoscope*, April, 1905.

257. HERRING. **Sarcoma of the vomer, with extensive involvement of the adjacent structures and metastasis in the cranium.** *Amer. Jour. Med. Science*, August, 1905.

247. GLAS. *On the histology and etiology of the so-called bleeding septal polyp.*

The histological examination of 9 septal polyps confirms in general the conditions described by previous authors. As to their origin, he agrees with Siebenmann, though special weight is laid on the fact that glands are extremely rare. He believes that the presence of glands in the tissue changed by the anterior dry rhinitis (Siebenmann) favors the origin of a perforating ulcer; the absence of glands, however, favors the development of a bleeding septal polyp. ZARNIKO.

248. CHIARA. *On the diagnosis of neoplasms of the maxillary antrum.*

Chiara begins with the statement that almost all benign tumors occasionally occur in the maxillary antrum, most frequently, however, polypi and cysts. Hydrops of the antrum of Highmore is a relatively rare disease. Among the malignant tumors there are sarcomata and carcinomata. In a differential diagnostic sense it must be stated that the benign tumors grow slowly, cause no pain, and gradually extend the walls of the antrum of Highmore, while malignant tumors grow more rapidly and are associated with purulent or bloody discharge. Dentigerous and alveolar cysts are relatively frequent. They extend into the Highmore cavity and may occlude this space. Tuberculosis of the antrum is very rare, while gummatous tumors have not been observed. Therapeutically in the treatment of tumors of the antrum of Highmore a broad opening is alone of service.

NOLTENIUS.

249. BROECKART. *Ethmoidal endothelioma.*

Endothelioma originated from the right ethmoid bone in a man twenty years of age, with marked protrusion of the eyeball. As a suitable method of operating, the method of Moure is given. This was described in the Congress of the French Otological Society in 1902. Endothelioma occurring in the nose is rare. There have been only 12 cases reported in literature.

OPPIKOFER.

250. TOEPLITZ, M. and KREUDER, H. *Rhinoscleroma.*

In the geographical distribution of rhinoscleroma New York shares with five cases, four immigrated from Galicia and one a German woman from Marburg. Of these, two are reported by Toeplitz,

women between twenty-five and twenty-seven years of age, one with a tumor in the mouth and a simultaneous one in the nose, and the other with a swelling, obstructing the left nostril entirely, and extending into the naso-pharynx; the velum studded with nodular swellings and the uvula missing, but seen inverted in the naso-pharynx. The microscopical features are minutely described and illustrated by Kreuder, consisting of round-cell infiltration, vacuolization in the cells (Mikulicz cells), epithelial pearls as a typical hyperplasia, formation of connective tissue, spherical hyaline bodies, and numerous rhinoscleroma bacilli, chiefly in the vacuolized and also in the epithelial cells. Pure cultures were obtained in gelatin media and agar-agar and were stained best by Gram's method, showing the capsule. The Friedländer bacillus is negative to Gram's stain, but produces indol and gas.

M. TOEPLITZ.

251. PHILLIPS, W. C. *A case of melanotic sarcoma with manifestations in the nose, naso-pharynx, mouth, and larynx.*

A man, aged forty-seven, had a mole on the right leg just above the knee, unchanged for seventeen years, which then increased and was removed. In one year another, within one inch to the left from the original, was partly removed, and 1½ years ago, after reappearing, radically removed. Immediately afterwards small black specks appeared upon various parts of the body, some grown ½ to ¾" in diameter, others not larger than a pin-head. A large one appeared on the left side of the nasal septum, another on the soft palate, another in the post-nasal space with little induration; those on the mucous membrane spread out and were less oval. There are altogether 110 small dark growths, very dark blue, almost black: melanotic sarcoma. Marked scotoma, pigmentation below the left disk. History of syphilis eleven years ago.

M. TOEPLITZ.

252. SMITH, HARMON. *Primary epithelioma of the uvula.*

A man, aged fifty-one, an inveterate pipe smoker, with difficulty of swallowing for one year, had an angry strawberry-looking mass on the uvula with induration extending outward on the soft palate of the right side for ½", an erosion on the surface and a creamy exudate thereon. A large hard gland was in the opposite sub-maxillary region. Pain in the right ear, emaciation, cachexia. The tumor and a large portion of the soft palate were removed, leaving a U-shaped opening. After four weeks a redness and induration

of the right border of the wound caused the removal of the lower and right border of the palate as far as the right pharyngeal pillars. The removed piece contained epithelial cells in whorls. Three months later a small granular tumor, of the size of an apple seed, appeared at the upper angle of the wound, growing to the size of a pea. By operation all suspicious parts on the right side were taken out and also the gland on the opposite side, which was not positively epitheliomatous. No recurrence took place five months after the first operation. M. TOEPLITZ.

253. MCCOY, J. *Adeno-carcinoma of the nose. Killian's operation for radical removal.*

In a man, aged forty-seven years, an obstruction of the right nostril had existed for $3\frac{1}{2}$ years, caused by a growth, pieces of which were removed. A dark grayish-red, soft, easily bleeding tumor returned, springing from the middle turbinate and the ethmoid cells. Middle turbinate removed, ethmoid cells curetted. A return after $1\frac{1}{2}$ years with implication of the frontal sinus; curettement; return. Adeno-carcinoma. Killian's operation. The frontal sinus was filled by tumor; the posterior wall was deficient $\frac{1}{4}$ " in circumference; the growth was here adherent to the dura. Naso-lachrymal duct curetted. Nasal process of the superior maxilla removed. Ethmoid cells, sphenoid sinus, inner aspect of the nasal bridge, and anterior portion of the septum curetted. M. TOEPLITZ.

254. CLARK, J. P. *Glioma of the nose. Report of two congenital cases.*

Case 1. A boy, aged two years, had a soft, rounded tumor of the nose, of the size of a robin's egg, from birth, resembling a fatty tumor. The left nostril was completely obstructed by a pinkish-gray polypoid growth, a piece of which was microscopically found by Jonathan Wright to consist of a typical neuroglia. The glioma was associated with a teratomatous tumor. Case 2. A boy, aged ten weeks, had a pinkish-gray polypoid mass in the left vestibule, obstructing the same. The removed portion showed gliomatous tissue (Jonathan Wright). There was no external deformity. M. TOEPLITZ.

255. HARLAND, W. G. B. *Papilloma in syphilitic child occluding both nostrils.*

A boy, aged eight, colored, with soft tumor masses from both nostrils, with muco-purulent discharge, which disappeared under

mercury and potassium iodide ; then a large septal perforation was seen.

M. TOEPLITZ.

256. SMITH, H. *Naso-fibroma treated by injection of monochloroacetic acid.*

A young man, aged sixteen, had a complete obstruction of the right naris and a marked one of the left, through a fibrous tumor occupying the entire right post-nasal space and projecting over the orifice of the right Eustachian tube and beyond the septum into one-third of the left post-nasal space, attached to septum, turbinas, and floor of the right naris. Smith injected with Coffin's post-nasal syringe 3 minims of monochloroacetic acid, repeated at intervals of from two weeks to two months, in all making fourteen injections. The tumor sloughed away. In order to avoid the dropping of acid into the throat after injection into sloughened portions, Smith has made the needle longer and protected it by a jacket which conceals it until the point of injection is reached ; a small cup-shaped tip catches any excess of acid.

M. TOEPLITZ.

257. HERRING, A. P. *Sarcoma of the vomer, with extensive involvement of the adjacent structures and metastasis in the cranium.*

A young man, fifteen years old, received a severe injury to the right side of the head, while chopping wood, followed by headache, earache, and enlarged cervical glands on the right side. Six months later great loss of weight, slow cerebration. Pain in the right ear and head, slight ptosis of the right upper lid, paresis of r. facial ; ear normal, r. anosmia. Slow and indistinct speech, mouthing of words. Small vascular tumor attached to vomer in r. nostril, extending half-way across posterior nares. Frequent epistaxis of r. nostril. R. side of face anæsthetic corresponding to the distribution of first and second divisions of trifacial nerve, extending into buccal cavity and to the palate and pharynx. Tendency when walking to fall from side to side. Slight relative leucocytosis. There is constant dripping of mucus and blood from the nose. The tumor had now infiltrated the pharyngeal wall, completely occluding the posterior nares on the right side, and extending down into the oro-pharynx and upward to the base of the skull. Malignant growth with cerebral metastasis suspected. No operation. Bulging of right cheek and slight exophthalmus of right eye. Paralysis of third, fourth, and sixth nerves supplying the r.

ear. Resection of r. superior maxillary. Cauliflower growth removed from naso-pharynx. Superior maxillary not involved. Nasal septum and sphenoid sinuses destroyed. Death six hours after operation. Autopsy: After removing the brain a firm, rounded growth, about the size of an English walnut is seen occupying a part of the right middle fossa of the skull, placed close to the apex of the petrous portion of the temporal bone on its anterior surface. The growth is beneath the dura, and entirely separated from adjacent structures. In the median line of the brain is seen a large cheesy mass. The growth is entirely separated from the broken-down mass. The anterior surface of the pons is flattened. Complete disintegration of nasal septum, sphenoidal and ethmoidal sinuses, the finger readily entering the cranial cavity through the sphenoid bone. The metastatic deposit has pressed upon and destroyed the third and fourth ophthalmic and superior maxillary branches of the fifth and sixth cranial nerves. The growth was a spindle-celled sarcoma.

M. TOEPLITZ.

d.—SEPTUM.

258. FREER. **A modified Grünwald forceps for correcting bone deviations of the septum.** *Arch. f. Laryngol.*, vol. xvii., No. 1.

259. FREER. **The window resection in deviations of the septum.** *Berliner klin. Wochenschr.*, No. 39, 1905.

260. BALLENGER. **A new technique for the submucous resection of the cartilaginous septum. The swivel septum knife.** *The Laryngoscope*, June, 1905.

261. YANKAUER. **Submucous resection of the deviated nasal septum.** *Amer. Journ. of Surgery*, June, 1905.

262. SWAIN. **Facial asymmetry as a possible cause of deformity of the nasal septum.** *The Laryngoscope*, July, 1905.

263. HEFFERMAN. **The submucous resection of the nasal septum.** *Boston Med. and Surg. Journ.*, August 31, 1905.

264. FREER. **Deflections of the nasal septum and their correction by the window resection.** *Ann. otol., rhinol., and laryngol.*, June, 1905.

265. WELLS. **A new septotome.** *Journ. Amer. Med. Assoc.*, August 19, 1905.

258. FREER. *Modified Grünwald forceps for correcting bone deviations of the septum.*

This is a very strong conchotome which works transversely. The author claims it possible to act upon firm bone in the septum.

The author's objection to the use of the chisel in deviated

septa is not shared by the reviewer. The latter objects to the use of the trephine, and thinks that this instrument can be advantageously replaced by the chisel. ZARNIKO.

259. FREER. *The window resection in deviations of the septum.*

An exhaustive description of the author's operation as published in 1901, with the review of 68 cases and a description and illustrations of the instruments. This method does not show any important improvement on the older methods. MUELLER.

260. BALLENGER. *A new technique for the submucous resection of the cartilaginous septum. The swivel septum knife.*

Ballenger devises for the removal of the cartilaginous portion of the septum in the submucous operation a swivel septum knife. The blade is pivoted to the extremities of the tuning-fork-like prongs of the instrument, and swings in a circle, cutting in any direction in which the distal ends of the prongs are directed. The cartilage is removed in one piece with one cut of the swivel knife. M. TOEPLITZ.

261. YANKAUER, S. *Submucous resection of the deviated nasal septum.*

Yankauer makes a vertical incision only, carrying it outward half-way to the outer wall. The perforation through the cartilage is made with the sharp spoon, and the mucous membrane of the opposite side is separated by means of a hook-shaped elevator of his own device. The beginning of the bony deviation must be removed, as also the tough fibrous tissue separating the bone from the dislocated cartilage, if such be the case. There is a minimum of scar and crust formation. The flap is ballooned by the inspired air. Perforations did not occur after this method. M. TOEPLITZ.

262. SWAIN, H. L. *Facial asymmetry as a possible cause of deformity of the nasal septum.*

From a series of studies on the skulls of the Hawaiian and the Flathead, Swain arrived at the following conclusions: Adenoid stoppage does not always cause overarched of the palate, which does not always produce bends on the septum. Overarched palates and bent septa often occur together, and each is more frequent in skulls which are leptoprosopic (with a high and narrow facial skeleton). Leptoprosopic skulls and faces almost never exist in a marked degree without some distortion or

over-arching in the palate and changes in the nasal cavity. In a young child about to develop into marked leptoprosopia, nasal stoppage by adenoids cannot fail to add to the degree of the deformity by interfering with the normal growth of the superior maxillary bones. From the study of the Flatheads it is demonstrated that the asymmetry of the skull has produced not only a difference in the size of the two parts of the nose, but also bends in the septum. Such bends are present in the living where there is facial asymmetry. The causes of asymmetrical development are more often inherited or congenital than acquired.

M. TOEPLITZ.

263. HEFFERMAN, D. A. *The submucous resection of the nasal septum.*

Hefferman does not cut through the cartilage, but goes around the free border by carrying his first incision along the free end of the quadrangular cartilage, and dissecting the mucosa of the vestibule backward over the deviation, also on the concave side. The free cartilage is removed by a circular motion of a narrow gouge, the bone with a Grünwald punch.

M. TOEPLITZ.

264. FREER, O. T. *Deflections of the nasal septum and their correction by the window resection.*

Freer has performed 116 submucous resections of deflection of the nasal septum : 6 in young children between eight and nine years old ; 8 were sigmoid, horizontally obstructing both nares ; 41 cartilaginous and bony, and 9 entirely bony ; 66 were double-angled, 22 crest-like deflections, one with deflection and congenital bony atresia of the choana ; 8 were bowed or C-shaped horizontally and vertically ; 10 were of an irregular form, in two of which the vomer was bent upon itself horizontally. In 20 cases there was a dislocation of the anterior free border of the quadrilateral cartilage. Thirteen perforations occurred, five in the last 101 operations. The window resection is adapted to children, but a very complete removal of the deflection is demanded. The cartilage and bone of the septum are reproduced in the window after the resection. Sinking in of the nasal bridge has never been seen ; a strip of the cartilage of the septum should be retained under the lateral cartilages of the external nose. The lower portion of the quadrangular cartilage may be resected from the anterior inferior free border horizontally back to the bone. The

operation is done in recumbent position, except when operating the nasal floor, with an electric headlight and cocaine anæsthesia with the pure powder and adrenalin 1 : 1000; in children, under superficial narcosis. The denuded cartilage is cut out in one piece. Strips of lint impregnated with subnitrate of bismuth make the best tampon. Many pictures illustrate the different deflections, the operation, and instruments. M. TOEPLITZ.

265. WELLS, W. A. *A new septotome.*

The instrument is used as a substitute for the knife or scissors in cases of uncomplicated deviation of the cartilaginous septum. It cuts out of the cartilaginous portion of the septum a more or less tongue-shaped flap, which may be shortened by means of a screw to any desired length, and, when cut, is bent well to the other side. It has a large and a small jaw, the former for the free side, the latter for the obstructed side. The flat band of steel attached to the larger jaw acts as a spring to force the flap into the median line. M. TOEPLITZ.

c.—DISEASES OF THE ACCESSORY SINUS.

266. GERBER. On the treatment of empyema of the maxillary antrum. *Arch. f. Laryngol.*, vol. xvii., No. 1, 1905.

267. HECHT. On the symptoms of empyema of the maxillary antrum. *München. med. Wochenschr.*, No. 37, 1905.

268. TELLIER. Dentigerous cysts of the superior maxilla. *Lyon médical*, No. 28, p. 49, 1905.

269. ZALEWSKI. A case of cranial suppuration of nasal origin. *Wiener klin. Wochenschr.*, No. 38, 1905.

270. MERMOD. Leptomeningitis after Killian's operation. *Arch. internat. d'otol.*, etc., vol. xx., p. 48.

271. HOFFMANN. The operative treatment of chronic frontal empyema. *Wiener klin. Rundschau*, No. 45, 1904.

272. BERENS. The comparative results of conservative and radical methods of treatment of disease in the sphenoid sinus. *The Laryngoscope*, August, 1905.

273. SHIELDS. A case of melancholia relieved by ethmoidal operation. *The Laryngoscope*, June, 1905.

274. MOSHER. The applied anatomy of the frontal sinus. *Boston Med. and Surg. Journ.*, Sept. 7, 1905.

275. INGERSOLL. The nose and its accessory sinuses in the American bear. *Annals of Otol., Rhinol., and Laryngol.*, June, 1905.

276. CARTER. A case of extreme sepsis from multiple sinusitis. *N. Y. Med. Journ. and Phila. Med. Journ.*, May 27, 1905.

277. LEONARD. A case of sarcoma of the maxillary sinus. *Annals of Otol., Rhinol., and Laryngol.*, March, 1905.

278. RICHARDS. **On the relative frequency of the dental and nasal origin of antral empyema.** *Annals of Otol., Rhinol., and Laryngol.*, March, 1905.

279. McCaw. **Orbital and meningeal infection from the ethmoid cells.** *Amer. Journ. Med. Science.* August, 1905.

280. MYLES. **The maxillary antrum.** *The Laryngoscope*, August, 1905.

281. RICHARDS. **The treatment of empyemata of the maxillary sinus through the nose.** *Journ. Amer. Med. Assoc.*, Sept. 16, 1905.

282. INGALS. **New operation and instruments for draining the frontal sinus.** *The Laryngoscope*, August, 1905.

283. COAKLEY. **The frontal sinus.** *The Laryngoscope*, August, 1905.

266. GERBER. *On the treatment of empyema of the maxillary antrum.*

The author favors his own operation, which differs from the Caldwell-Luc method, inasmuch as he makes the nasal opening in the middle meatus instead of in the lower meatus.

ZARNIKO.

267. HECHT. *On the symptoms of empyema of the maxillary antrum.*

Report of a case of suppuration of the maxillary antrum with dysphagia, marked weakness, and multiple neuritis. A second case of disease of the accessory sinus terminated fatally from meningitis.

SCHEIBE.

268. TELLIER. *Dentigerous cysts of the superior maxilla.*

This was a cyst in the right upper jaw of a woman thirty-five years of age. The second molar tooth only remained. At operation it was found that the thin cyst wall was attached to the neck of the wisdom tooth, which projected with its white surface into the cavity. The epithelium of the cyst wall consisted of a single layer of cubical cells, in some places stratified epithelium.

OPPIKOFER.

269. ZALEWSKI. *A case of cranial suppuration of nasal origin.*

This is a report of a case in which there was a suppurating fistula just above the right eyebrow, permitting a probe to enter to a depth of 1 cm downward and inward. No tenderness over the frontal sinus, no headache, no marked discharge from the nose. There was a large polyp in the left side of the nose. On enlarging the fistula it was found that the probe was not situated in the frontal sinus but in the ethmoid sinus, and that the pus originated in this region. The dura was perforated. The

ethmoid was not carious. The frontal sinus was not opened. Recovery after six weeks. This is a case of suppuration in the horizontal plate of the ethmoid bone. WANNER.

270. MERMOD. *Leptomeningitis after Killian's operation.*

A man fifty-nine years of age complained of headache on the second day following a Killian operation. Temperature, 37.6° . On the following night the patient became delirious, and suddenly lost consciousness. To this was added aphasia and periods of delirium, with rises of temperature. The wound showed no discharge. Four days later death. At autopsy a purulent meningitis at the base and concavity was present and a hemorrhage in the right temporal lobe.

The author is inclined to regard the Killian operation as responsible for this unfortunate termination, inasmuch as he had operated on 165 cases after the method of Ogston-Luc without fatality. The case, however, is not quite complete. No path of infection was found between the operated-on area and the interior of the skull, not even microscopically, and the dura and pia over the frontal and ethmoid sinuses appeared normal. The autopsy was limited to an examination of the head.

OPPIKOFER.

271. HOFFMANN. *The operative treatment of chronic frontal empyema.*

The paper is introduced by a description of the common methods of opening the frontal sinus as well as the various osteoplastic methods.

A report of 46 cases then follows, of which 38 were chronic and 8 acute. Of these 11 were bilateral. In the 38 chronic cases the ethmoid was also diseased in 20 cases. In 26 operated upon after Kuhnt, 16 were healed.

The author's operation is as follows: Incision below the eyebrow, then 5cm from the margin of the orbit through the periosteum. The latter is retracted as little as possible in a downward direction. A small opening is made for purposes of diagnosis. Then a periosteal bone flap is made after Koch. The wound is sutured primarily or secondarily after two days. A drainage tube is inserted—spiral drain of silver wire—which remains up to three months. Then the naso-frontal duct is treated with a 6-12 % solution of silver nitrate. WANNER.

272. BERENS, T. P. *The comparative results of conservative and radical methods of treatment of disease in the sphenoid sinus.*

Berens has seen only 7 cases in which the sphenoid alone was diseased; in 37 other cases its disease was associated with disease of the ethmoid, of which 28 had also either frontal or antral disease or a pansinusitis of the affected side. Of the 7 purely sphenoid cases, 2 were acute and 5 chronic. The acute yielded to conservative measures (adrenalin, douching). The 5 chronic cases were treated by removal of obstructions outside and within the ostium. Of the sphenoid and ethmoid cases 10 were acute and 17 chronic. The treatment of chronic sphenoid disease when complicating a chronic multiple sinusitis involving the ethmoid and either the maxillary antrum or the frontal sinus, should be carried out through operation by way of the maxillary antrum or the frontal sinus, and thence through the ethmoid labyrinth into the sphenoid sinus.

M. TOEPLITZ.

273. SHIELDS, W. B. *A case of melancholia relieved by ethmoidal operation.*

A man, aged twenty-nine, had been suffering for two years with a dull aching headache, dulness, and inability to fix his attention to business. He attempted suicide and was confined to an asylum for six months. Two months after his discharge the old symptoms, headache, melancholia, and loss of memory, reappeared. After removing both middle turbinals and scraping of ethmoid cells, the patient recovered and resumed his business.

M. TOEPLITZ.

274. MOSHER, H. P. *The applied anatomy of the frontal sinus.*

Mosher gives a clear and concise description of the anatomy of the frontal sinus. He considers the sinus of an offshoot of the ethmoidal labyrinth and ascribes to it the form of a triangular pyramid. After going over the development, size, mucous membrane, blood and lymph supply, and nerves, he describes the small and large sinus and their prolongations. The septum and the incomplete or partial septa, the anterior and cranial walls, and the floor of the sinus with its orbital and nasal part, the pulley, middle meatus, frontal canal, and the superior opening of the naso-frontal duct are minutely given. The catheterization of the naso-frontal duct concludes the paper.

M. TOEPLITZ.

275. INGERSOLL, J. M. *The nose and accessory sinuses in the American bear.*

The anterior half of the bear's nose is used for respiration, the posterior half is divided into a respiratory and an olfactory portion. The septum in the median line is a thin plate of bone and cartilage. From each side of the vomer a thin shelf-like plate of bone extends laterally across each fossa, subdividing the posterior part of each fossa into two superimposed cavities. The larger superior cavity contains almost all of the ethmoidal turbinals and forms the greater part of the olfactory portion of the nose. The inferior cavity is a round tube-like structure, leading directly backward from the maxillary turbinal to the nasopharynx. The maxillary turbinal in the anterior part springs from a broad base, from which numerous branching processes are given off, which form an intricate labyrinth almost completely filling the anterior third of each nasal fossa. The ethmoidal turbinals, five in each fossa, radiate from the convex fossa of the cribriform plate of the ethmoidal bone. Each consists of a mass of delicate wavy plates subdividing into almost innumerable branches, which intertwine with each other. The labyrinth is lined throughout by a mucous membrane, in which the numerous branches of the olfactory nerves are distributed. Some of the numerous branches of the ethmoidal turbinal extend into each of the accessory cavities of the nose. The largest superior ethmoidal turbinal, and one of its processes, extending anteriorly, overlaps the maxillary turbinal throughout its entire length. The paper is accompanied by four plates illustrating the text.

M. TOEPLITZ.

276. CARTER, W. W. *A case of extreme sepsis from multiple sinusitis.*

A girl, aged twenty-two, had, after grippe occurring four years ago, continuous discharge of pus from the nose for two years, when the right side improved and the left side only became affected. The left cheek was occasionally swollen and painful, and severe occipital and vertical headaches and left facial neuralgia were felt. Pus from the left middle meatus, polypoid degeneration of middle turbinate, pus over the end of the inferior turbinate. Radical operation of antrum through the canine fossa, which was emptied of pus and granulations; the inferior turbinate and inner wall of the antrum, down to the floor, were removed. On the third day after the operation, pain in both knees and the

right wrist set in; these joints and the legs were swollen and œdematous. Severe occipital headaches, hectic flush on cheek; urine contained albumen. Temperature 99° – 103° ,—all this persisting for three weeks. Slight amelioration took place, but five weeks after operation an exacerbation with pain in shoulders, elbows, wrists, fingers, knee, ankles, and jaw occurred; the left eye was protruding; mental dulness was observed. After six weeks, a violent chill, with temperature 106.4° ; unconsciousness and collapse, but rallied after saline infusion. She gained in strength; had after two months a radical operation upon the remaining ethmoid cells and the sphenoid through the maxillary route; recovery.

M. TOEPLITZ.

277. LEONARD, Z. L. *A case of sarcoma of the maxillary sinus.*

A man, aged fifty, had suffered from epistaxis from the right nostril and an enlargement of the right inferior turbinal, with pain in the right side of the face. Two months after first presentation, the lower turbinated was removed under ether; the finger, entering the sinus through wide space in bony wall, came in contact with a soft, friable mass. The orbital wall was destroyed and the eyeball felt. A counter opening was made through the canine fossa, the knife immediately penetrating the sinus through another opening in the bony wall. The cavity was curetted. The tumor was a round-celled sarcoma. The patient died after four months. A small non-malignant tumor had been excised from the vicinity of the left mamma $1\frac{3}{4}$ years ago, and a second sarcomatous growth with the axillary glands about a year before the antral operation.

M. TOEPLITZ.

278. RICHARDS, G. L. *On the relative frequency of the dental and nasal origin of antral empyema.*

After a review of the recent literature Richards tabulates thirty-one cases of empyema of the antrum, of which 64.6 % were of nasal, twenty-nine of dental origin: 3.2 % traumatic, 3.2 % luetic. The only treatment of chronic cases is the radical operation through the canine fossa with counter opening through the inferior nasal meatus.

M. TOEPLITZ.

279. McCaw, J. F. *Orbital and meningeal infection from the ethmoid cells.*

A man, aged forty years, had for three years a yellow discharge from each nostril, with increasing nasal obstruction. Aproxesia, depression, apprehension concerning his sanity, and

lately severe pains at the nasal root, spreading over the entire left side of the face. Two days later swelling and œdema at the upper and inner part of the left orbit, involving both lids, conjunctiva, cheek, and left side of nose. Temperature 100° to 103° . Mental hebetude, mild delirium. Small swelling over left temporal region. Now swelling of lid and chemosis subsided. Polypi were in the right nostril with pus between; in the left were also polypi with pus. There was an intracranial involvement following an acute exacerbation of a chronic suppurative ethmoiditis. The swelling over the temporal region was incised: a subperiosteal collection of two ounces of pus was discharged. Stupor, muttering delirium, subsultus tendinum, high temperature and pulse, Cheyne-Stokes's phenomenon, were followed by death twenty-four hours later. The affection had originated in the ethmoid cells, broken through the os planum, orbital roof, and extended to the angular process of the temporal bone.

M. TOEPLITZ.

280. MYLES, R. G. *The maxillary antrum.*

Myles advocates radical surgery on all cases of exposed bone necrosis beneath the periosteum and at the roots of the teeth, on all cases of extensive polypoid changes in the mucosa, on all cases of osteomyelitis, and on neoplastic growth. His conservative treatment consists of an operation with curved chisels which cut going in and coming out, with the rongeur forceps, and with the occasional aid of the electric trephine. The antro-nasal wall within the inferior meatus is removed, if possible, with a part of the inferior turbinate. The cavity is curetted with malleable handle curettes.

M. TOEPLITZ.

281. RICHARDS, G. L. *The treatment of empyemata of the maxillary sinus through the nose.*

Richards holds that between the opening through a tooth-socket and the radical procedure through the canine fossa with nasal counter-opening, the washing out after exploratory puncture underneath inferior turbinate, or above it, will effect cures in acute cases or in chronic ones, where the antrum is merely acting as a reservoir. In case of continued suppuration or degeneration of the antral walls, or polyps, the opening should be enlarged by curettes and alligator forceps and the cavity scraped out. Then, if the condition does not improve, the radical operation should be performed.

M. TOEPLITZ.

282. INGALS, E. F. *New operation and instruments for draining the frontal sinus.*

Ingals's operation consists in passing a steel pilot through the natural canal into the frontal sinus and running in over this a hollow burr, by which a canal, 6mm in diameter, is made, and inserting into this canal a self-retaining gold tube, so large that the pus will necessarily drain and that the patient may easily wash out the sinus. M. TOEPLITZ.

283. COAKLEY, C. G. *The frontal sinus.*

In a series of fifty-eight cases of acute frontal sinusitis, fifty-four made a complete recovery as a result of intranasal treatment, but one patient died from meningitis 23 hours after excision of the middle turbinal. Of the three cases operated on externally, two recovered, and one with syphilis died from meningitis and sepsis. Of seventy-nine cases of chronic frontal sinusitis, treated intranasally, 14 % were cured, 51 % not cured, and in 35 % the result is unknown. In twenty-five chronic cases, operated with the Ogston-Luc operation, the result was excellent, but in more than half the secretion and headache soon returned. Of 104 patients, in nine of which both frontal sinuses were involved, treated with Coakley's open method, two are dead, one has a fistula, and 101 are living, cured of the frontal sinusitis. M. TOEPLITZ.

f.—OTHER DISEASES OF THE NOSE.

284. VOHSEN. *The treatment of coryza in sucklings and small children.* *Berliner klin. Wochenschr.*, No. 40, 1905.

285. MOHR. *On the etiology and treatment of hay fever.* *München. med. Wochenschr.*, Nos. 33 and 34, 1905.

286. HEINDL. *Hay fever and its specific treatment with pollantin.* *Wiener klin. Wochenschr.*, No. 23, 1905.

287. WOLFF. *Hay fever and its treatment with serum.* *Wiener klin. therapeutische Wochenschr.*, No. 29, 1905.

288. GERBER. *Bacteriologic and clinical diagnosis in fibrinous inflammation of the upper air passages.* *Berliner klin. Wochenschr.*, No. 31, 1905.

289. KAHLER. *On the treatment of scleroma with radium.* *Wiener klin. Wochenschr.*, No. 32, 1904.

290. KOLIPINSKI. *The treatment of chronic nasal catarrh with sulphur.* *Medical News*, August 19, 1905.

291. KEIFER. *Spontaneous hemorrhage from an inflamed tonsil.* *The Laryngoscope*, June, 1905.

292. WALLACE. *Anæsthesia in throat surgery.* *N. Y. Med. Journ. and Phil. Med. Journ.*, June 24, 1905.

293. MACCOY. A further clinical study of hay fever with the employment of pollantin. *American Medicine*, July 1, 1905.

294. SINEXON. Nasal condition dependent upon the generative organs. *Medical News*, May 6, 1905.

284. VOHSEN. *The treatment of coryza in sucklings and small children.*

Coryza in children has received greater attention in recent years on account of the conditions found in epidemic cerebro-spinal meningitis. In the treatment, the most important feature is the regular removal of the discharge by means of the air douche. In addition, small quantities of a solution of cocain-adrenalin are instilled.

MUELLER.

285. MOHR. *On the etiology and treatment of hay fever.*

Pollantin in powder form is more efficacious than the fluid pollantin; nevertheless in a large number of cases it gives no result. The instillation of aristol into the maxillary antrum was successful in twelve out of thirty cases. Operations on the nose are of value in only a small number.

SCHEIBE.

286. HEINDL. *Hay fever and its specific treatment with pollantin.*

The serum must be employed during the entire hay-fever period every morning before rising. The bedclothes should not be aired, because pollen is likely to be deposited upon them. The various exciting factors of an attack should be avoided, then in most cases, by the repeated use of pollantin, the affection can be prevented or alleviated.

WANNER.

287. WOLFF. *Hay fever and its treatment with serum.*

A report of ninety cases. A distinction is made between a conjunctival and a nasal form. There are some cases which are improved, in others the treatment is useless, while in still others the malady is aggravated. No case of hay-fever asthma was modified by pollantin.

Pollantin is to be regarded as a lytical complementary serum for pollen.

WANNER.

288. GERBER. *Bacteriologic and clinical diagnosis in fibrinous inflammation of the upper air passages.*

This paper is based on 40 cases of fibrinous rhinitis and 127 cases of fibrinous pharyngitis.

1. In fibrinous rhinitis, in three-fourths of all the cases, diphtheria bacilli are present. In fibrinous pharyngitis, they are not present in one-half the cases. Nasal diphtheria is probably less

frequent than pharyngeal diphtheria, because fibrinous inflammations occur more rarely in the nose than in the throat.

2. General disturbances are absent in three-fourths of the cases of fibrinous rhinitis, in about one-half the cases of fibrinous pharyngitis, and as frequently in the cases with diphtheria bacilli as in those without. The general symptoms are, therefore, no criterion.

3. A specific anti-diphtheritic treatment should only be employed when the clinical symptoms coincide with the results of the bacteriological examination. MUELLER.

289. KAHLER. *On the treatment of scleroma with radium.*

A patient, forty-eight years of age, had suffered for twenty-five years with scleroma. He was treated with 60mg radium bromid, in which the illuminating body was directly applied on the diseased parts. The treatment was continued with the X-rays. The author is inclined to think that the radium should replace the X-rays where the specimen can be directly applied in contact with the diseased area, as in scleroma of the nose and of the larynx. WANNER.

290. KOLIPINSKI. *The treatment of chronic nasal catarrh with sulphur.*

In a simple chronic rhinitis, intumescent rhinitis, in the earlier stage of atrophic rhinitis, in simple chronic naso-pharyngitis (American catarrh), in scrofulous rhinitis and epistaxis, Kolipinski blows sulphur præcipitatum freely and thoroughly into the nose with a strong powder-blower. Hypertrophic rhinitis and hyperplastic naso-pharyngitis are thereby benefited.

M. TOEPLITZ.

291. KEIPER, G. F. *Spontaneous hemorrhage from an inflamed tonsil.*

A farmer, aged thirty, had a right peritonsillar abscess opened and evacuated. Two days later he began to bleed from the throat, the hemorrhage being posterior to the tonsil. It ceased after thirteen hours. He left the hospital on the following day, but the hemorrhage recurred after thirty-six hours and did not cease until after fourteen hours. Packing with antipyrin and tannin; internal administration of calcium chlorid, eight grains pro dosis, in two doses, and adrenalin were given. Similar reported cases are cited. M. TOEPLITZ.

292. WALLACE, H. *Anæsthesia in throat surgery.*

Wallace prefers for anæsthesia, in throat surgery, the gas ether

sequence, with narcosis pushed well to palatal relaxation, the patient being in the dorsal position, with moderately lowered head placed upon a portable head-rest of his own device, attachable to any table.

M. TOEPLITZ.

293. MACCOY, A. W. *A further clinical study of hay fever with the employment of pollantin.*

For two seasons' trials, with two different Dunbar's serums, MacCoy infers that matters are still *sub judice*. The toxins of graminaceæ are not identical with the toxins in American weeds (goldenrod and ragweed). A composite serum will be required to correct the causes acting in American subjects of hay fever.

M. TOEPLITZ.

294. SINEXON, J. *Nasal condition dependent upon the generative organs.*

Sinexon arrived at the following conclusions; that turgescence and a marked degree of hyperæsthesia of the nasal mucous membrane occur during the procreative act; that a more or less marked periodical engorgement of the nasal mucosa exists during menstruation and pregnancy; that operations which destroy the function of the generative organs cause the nares to return to the state which existed prior to the advent of puberty; that in lower animals sexual excitement is always accompanied by occlusion of the nares; that the engorgement in the human family may result in epistaxis or hydrorrhœa; that the continued over-stimulation of the nasal mucous membrane, from sexual perversions, results in a relaxation of the same through vasomotor paresis.

M. TOEPLITZ.

PHARYNX AND MOUTH.

295. REICHE. **Plaut-Vincenti's angina.** *Münchener med. Wochenschr.* No. 33, 1905.

296. MORIAN. **Ulcerating stomatitis and Vincenti's angina.** *Münchener med. Wochenschr.*, No. 35, 1905.

297. HUTTER. **On acute infectious processes in the pharynx and larynx.** *Wiener klin. Rundschau*, Nos. 47, 48, 1904.

298. BELOGOLOWOW. **On the relation of the arterial blood-vessels to the faucial tonsils and the danger of hemorrhage after tonsillotomy.** *Zvestija Imperatorskoj Wojenno-Medizinskoi Akademii*, vol. x., No. 2.

299. HEUKING. **On the cause and treatment of threatening hemorrhage after tonsillotomy.** *Arch. f. Laryng.*, vol. xvii., part 1, 1905.

300. GUERICH. **The tonsillar radical operation in articular rheumatism.** *Wiener klin. Rundschau*, Nos. 39, 40, 1905.

301. KILLIAN. (Worms) On the situation and evacuation of deep-seated abscesses in the region of the base of the tongue, and the adjoining wall of the pharynx from the outside. *Deutsche med. Wochenschr.*, No. 34, 1905.

302. GLAS. On the pathology of tumors at the base of the tongue. *Wiener klin. Wochenschr.*, No. 28, 1905.

303. WOOD. The lymphatic drainage of the faucial tonsils. *Amer. Jour. Med. Science*, Aug., 1905.

304. BARSTOW. Adenoids in the adult. *N. Y. Med. Journ. and Phil. Med. Journ.*, May 6, 1905.

305. LACK. Specimens of adenoids removed from a man aged fifty-nine years. *Proc. Laryn. Soc. London*, June 2, 1905.

306. LACK. A case of angioma of the soft palate. *Proc. Laryng. Soc. London*, June 2, 1905.

307. JOHNSTON. Papilloma of the lingual tonsil. *The Laryngoscope*, July, 1905.

308. MEANS. Tuberculosis localized in the third tonsil. *The Laryngoscope*, July, 1905.

295. REICHE. *Plaut-Vincenti's angina.*

Twenty-five cases which have been carefully examined bacteriologically. In one case of localization to the tongue a histological examination could also be made. The superficial epithelium was only involved. There was but little fibrin. The process was not always one-sided and not limited to the tonsils. The cases where only the fusiform bacillus was found ran a different course from those where spirilla were also present. In two cases there were subsequent paralysis of the soft palate and accommodating ataxia of the lower extremities. The treatment consisted in antiseptic irrigation; incision and cauterization with silver nitrate may be of service in some cases.

SCHEIBE.

296. MORIAN. *Ulcerating stomatitis and Vincenti's angina.*

Four cases of ulcerating stomatitis, one of which was combined with an ulcerous angina. Fusiform bacilli and spirochetæ were present in all. Duration $1\frac{1}{2}$ to $2\frac{1}{2}$ months.

SCHEIBE.

297. HUTTER. *On acute infectious processes in the pharynx and larynx.*

These are septico-pyæmic diseases originating in abscesses of the pharynx or larynx. The inciting factor was either the streptococcus, staphylococcus, or pneumococcus. The port of entry was taken to be the so-called physiologic wounds or slight injuries during swallowing. Three cases are reported. All terminated fatally.

WANNER.

298. BELOGOLOWOW. *On the relation of the arterial blood-vessels to the faucial tonsils and the danger of hemorrhage after tonsillotomy.*

The prominent part of the tonsil only should be operated upon. If the tonsillotomy is properly performed, it is impossible to injure the carotid arteries. Hemorrhages take place from small arterial and venous branches.

SACHER.

299. HEUKING. *On the cause and treatment of threatening hemorrhage after tonsillotomy.*

A report of six cases of threatening hemorrhage after tonsillotomy. In all cases the hemorrhage took place from the posterior palatal arch, which was injured at the upper pole of the tonsil, and always could be controlled by digital compression.

ZARNIKO.

300. GUERICH. *The tonsillar radical operation in articular rheumatism.*

In examining rheumatic patients the author found that the lacunæ of the tonsils were the seat of a chronic purulent inflammation. On incising the tonsils and curing this suppuration the rheumatism in each case was cured.

The proof that the seat of the infection is in the tonsil is given by the fact that after each operation on the tonsil there is an acute exacerbation of all the symptoms.

WANNER.

301. KILLIAN. *On the situation and evacuation of deep-seated abscesses in the region of the base of the tongue and the adjoining wall of the pharynx from the outside.*

Based on a report of a successfully operated-on case of deep-seated abscess at the base of the tongue, an interesting description of this disease is given with anatomic peculiarities and appropriate methods of treatment. These abscesses at the base of the tongue are different from the so-called angina Ludovici on account of the absence of a marked swelling and board-like infiltration of the floor of the mouth.

NOLTENIUS.

302. GLAS. *On the pathology of tumors at the base of the tongue.*

After a review of the literature, a report of two benign tumors in this situation is given. In a patient forty-four years of age, at the base of the tongue corresponding to the region of the foramen cœcum there was a small tumor which covered the anterior part

of the lingual tonsil, of a paler color than the surrounding mucous membrane. It was removed with a galvano-cautery.

Histologically the tumor consisted of mucous glands and smooth muscles.

The second tumor occurred in a girl twenty years of age, behind the central circumvallate papilla. The tumor had the shape of a glove finger and was about the size of a bean. Histologically it proved to be a hypertrophic lingual papilla.

WANNER.

303. WOOD, G. B. *The lymphatic drainage of the faucial tonsils.*

Wood gives a preliminary report concerning the lymphatic anatomy and drainage of the tonsils and surrounding portions of the throat. His first investigations concern the faucial tonsils. He made eight injections with Gerota's fluid of Berlin blue, turpentine, and ether into the tonsillar tissues of six children's heads, the majority showing distinctly that the tonsillar lymph follows a fairly constant route as follows: The lymph vessels pass from the external portion of the tonsil through the peritonsillar connective tissue, the pharyngeal aponeurosis, and the superior constrictor of the pharynx, and then below the facial artery. Bending more posteriorly the lymph vessels next ran between the internal jugular vein and the stylo-hyoid muscle, finally reaching the superior surface of an enlarged lymph gland, placed just beneath the anterior border of the sterno-cleido-mastoid muscle where it is crossed by the posterior belly of the digastric muscle. The efferent vessels from this gland are generally two or three in number, and pass into the neighboring glands of the internal jugular group with those receiving the tonsillar drainage from a complete lymph channel, through which the tonsillar lymph finally empties into the jugular lymph trunk. In none of the preparations did the injected fluid enter the superficial glands. Wood calls the lymphatic gland which receives the efferents of the tonsil the tonsillar lymph gland. Other lymph vessels from the throat besides those from the tonsil probably drain into this gland, but the most important infections of the cervical lymphatics originate through the tonsil. The term tonsillar may not be comprehensive, but it is appropriate. Wood gives a description of the individual injection, and illustrates the paper by seven pictures of the dissected specimens, showing the lymph glands and vessels in their relative position.

M. TOEPLITZ.

304. BARSTOW, D. M. *Adenoids in the adult.*

Barstow has collected and tabulated 57 cases of adenoids in the adult. The growth usually was soft, pulpy, and friable. The sexes were nearly divided. 61.4 % showed symptoms varying from nasal obstruction to chronic laryngitis. Many of these had hypertrophy of turbinated bodies and expectoration of thick muco-pus, which were relieved after removal of the growth. There were 25 cases with ear symptoms and 10 cases with tuberculosis.

M. TOEPLITZ.

305. LACK, LAMBERT. *Specimen of adenoids removed from a man aged fifty-nine years.*

A man, aged fifty-nine years, complained of deafness dating from an attack of influenza three months previously, with dry throat and nasal obstruction.

A large mass of adenoids was removed, with cure of all the symptoms.

ARTHUR CHEATLE.

306. LACK, LAMBERT. *A case of angioma of the soft palate.*

The patient was a girl aged twenty-one years, who had a bleeding tumor about the size of a shilling. It had grown rapidly during three months. On removal it was found to consist of cavernous tissue.

ARTHUR CHEATLE.

307. JOHNSTON, R. H. *Papilloma of the lingual tonsil.*

A male, thirty years old, with obstinate hoarseness of three or four months' duration and syphilis five years before. Lingual tonsil hypertrophied on both sides, with deep furrow in the middle line. On the left side, tumor about the size of a pea attached by narrow pedicle to lingual tonsil. On the epiglottis there is a small superficial ulcer. The vocal cords presented anteriorly two small ulcerations. The tumor was removed and proved microscopically to be a benign papilloma.

M. TOEPLITZ.

308. MEANS, C. S. *Tuberculosis localized in the third tonsil.*

A physician, twenty-nine years old, with a history of hemorrhages, night sweats, fever, loss of flesh, gagging and coughing spell in the morning followed by hemorrhages. Temperature, 99.5°. Chills, night sweats leading to weakness, and temperature 103.5° set in. A large Luschka's tonsil with small clots of blood over the surface was partially removed and contained numerous tubercle bacilli. No bacilli in the sputum. The remainder of the growth was also removed. Great relief was experienced from the operation. Flesh was regained and no other symptoms since then observed.

M. TOEPLITZ.

BOOK REVIEW.

II.—Manual of Diseases of the Ear, Nose, and Throat. By JOHN JOHNSON KYLE, B.S., M.D., Clinical Professor of Otology in Medical College of Indiana, etc. 12mo, 595 pp., 160 illustrations. Full leather, \$3 net. P. Blakiston's Son & Company, Philadelphia, 1906.

The great difficulty in successfully writing a brief manual is to know what to leave out, and to apportion an amount of space to each subject in relation to its importance. This has not been entirely accomplished in the enormous field which the author attempts to cover. The chapter on anatomy is well written and the illustrations are well chosen; special reference should be made to the illustrations of the lymphatics of the ear and pharynx. We fail to find, however, any description of the extremely important anatomic peculiarities of the child's temporal bone. The subject of treatment is fully and clearly dealt with, and, as is stated in the preface, comprises those methods which have been successful in the hands of the author. Considerable space is devoted to general information on bacteriology and pathology, which seem to the reviewer to be out of place. The clinical side of the subject is exhaustive as far as the number of lesions is concerned, though not uniform in excellence. To mention two examples: The author confuses the terms simple and radical mastoid operation. On page 257, "Bezold's Disease" is given as one of the indications for the radical mastoid operation in chronic purulent otitis. In the following pages the radical operation for acute mastoiditis and the so-called "radical operation" for chronic purulent otitis are described together as if they were at all similar, or one the extension of the other. Again, on page 401, an operation on the frontal sinus is described as the Killian operation, which is quite erroneous.

The book has so many good qualities and fulfils an actual want, that it is to be hoped that these inaccuracies and the uneven treatment of the subject-matter will be corrected in subsequent editions. The get-up of the book is very attractive and reflects credit upon the publishers.

A. K.

ARCHIVES OF OTOTOLOGY.

ACUTE PURULENT OTITIS AND MASTOIDITIS, TREATED BY MEANS OF ARTIFICIALLY IN- DUCED HYPERÆMIA, ACCORDING TO THE METHOD OF BIER, WITH REPORT OF CASES.¹

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Historical.—In 1903, Prof. Bier, of Bonn, published his work on the Therapeutics of Hyperæmia (*Die Hyperæmia als Heilmittel*, Leipsic, 1903), advocating a method for treating acute inflammatory and suppurating conditions in the human body which in principle stands in contradistinction to all other. Its action, undefined by him, depends upon heightening the inflammatory reaction rather than subduing it, thus attempting to aid nature to withstand the invasion of the body by the deleterious agents of disease. In 1905, he reported upon 110 cases of pronounced acute and subacute suppuration, wherein pus was evidenced by exploratory puncture, incision, or discharge from existing wounds or fistulæ, which were all treated by this method with varying degrees of success (*Muench. med. Woch.*, 1905-1907).

The cases consisted of suppurating abscesses, "pus joints," and purulent phlegmons. From his observations he concluded that by means of induced hyperæmia a method of treatment was provided in beginning suppurative processes,

¹ From the notes of a paper read at the meeting of the Section on Otology, of the New York Academy of Medicine, April 12, 1906.

which brought about results such as no other therapeutic agent heretofore had demonstrated, besides prominently advancing the possibility of avoiding grave and dangerous operations.

At the German Surgical Congress of 1905, Bier again demonstrated induced hyperæmia. Incidental to this demonstration, he reported that he had treated 18 cases of otitis media purulenta, of which 12 were cured at once, and the rest, failing to react, required operation. Cholesteatoma and sequestra were found at operation in these latter cases. He attributed his failure to effect cures to these findings and therefore considered these cases unsuitable for the exhibition of his method. Later his otological cases were reported upon at length by Keppler.

Meanwhile, prior to Keppler's publication, Heine tried the method at Lucae's clinic in Berlin, and made a report to the German Otological Society in June, 1905, on nineteen cases. (*Verhandlungen der deutschen otologischen Gesellschaft*, June, 1905.) Strictly following Bier's directions for inducing hyperæmia of the head, Heine applied the method to his ear cases.

In August, 1905, Keppler's reports were published. (*Zeitschrift für Ohrenheilkunde*, Bd. 50, translated and published in this number of these ARCHIVES.)

To complete the historical review of the method, it is necessary to call attention to the discussions which followed the reading of the above-mentioned reports. Thus we find that Voss, Heinsberg, Vohsen, Eschweiler, Kobrak, and others reported verbally varying degrees of success, but the material reported upon is in such shape that its scientific study is rendered impossible, because of the absence of detailed histories, and I have perforce been compelled to disregard these verbal reports.

Summary of Reports.—Summarizing these results, we find that among the twenty-one cases reported by Keppler—these including Bier's cases—eleven were acute otitis media evidencing positive mastoid involvement. These all healed in from two to four weeks without resort to the indicated operative procedures. Of the chronic cases, two healed without

operations; one other was cured after the removal of a polyp, and another after an incision had been made over the mastoid process. His other chronic cases did not react to the hyperæmic treatment and required operation.

Heine reported that he had employed the method in nineteen cases, among which there were four double involvements—that is, on twenty-three diseased ears. His results were as follows: In cases classified as otitis media acuta both with and without mastoiditis, cures were obtained without operative measures other than the performance of a paracentesis seven times in fifteen cases, the cure being complete in from six to ten days. One of these cured cases recurred after twenty-four days and demanded operative measures. Among his negative results we note an acute case evidencing necrosis of the epitympanic space, one with purulent infiltrate into the muscular tissues of the neck, and a case of otomycosis. His other negative results were regular cases which failing to react were operated upon. The three subperiosteal cases gave excellent results after simple incision to afford an outlet for the accumulated pus.

When medicine receives a new method of therapeutics and when such a line of treatment is not based upon a previously accepted theory, it is obvious that its empirical application to all sorts of cases is more or less a necessity until finally enough material has been subjected to trial, and from the judgment of results obtained the applicability of the suggested therapeutical agent eventually becomes limited to those cases wherein its empirical application had demonstrated the best practical results.

Hence we are not surprised to find the method employed by Bier and reported upon by Keppler not only in an attempt to cure pure cases of acute otitis media, complicated and uncomplicated by mastoiditis, but also find chronic otitis media with cholesteatoma and sequestra in the mastoid subjected by them to the influence of the method.

Because of Bier's negative results in the latter, Heine eliminated all such from among the cases he selected for congestive hyperæmia, nevertheless he employed the treatment in a case evidencing necrosis of the epitympanic space, a case of

otomycosis of the external auditory canal and drum, otitis media which had persisted for a long time prior to being brought under treatment, besides a case wherein the muscular tissues of the neck were infiltrated with pus, a Bezold's mastoiditis and subperiosteal abscesses, etc.

Neither Heine nor Keppler evidently had the benefit of each other's observation whereon to base an outline for the indications leading to the employment of hyperæmic treatment.

Again, it must be self-evident that, other things being equal, if we find certain results from the empirical exhibition of a new therapeutical agent recurring with more than coincidental frequency, always more or less under similar circumstances, an analysis of these conditions may lead to the hypothesis upon which the given results are obtainable.

A closer examination of the published case-histories of both Heine and Keppler presents the evidence that the results obtained were almost invariably good in all acute cases wherein the Bier bandage had been applied early in the course of the disease. Therefore I limited the trial of the method only to such acute cases which came early under my observation in the course of their ear disease. Chronic cases I eliminated, because enough evidence was already at hand, in the first place, of a lack of certainty in results among such, and in the second place, because chronic cases being ambulatory would hardly submit to hospital confinement and bed-rest for weeks at a time when assurances of cure without operation could not reasonably be held out.

Since beginning work along these lines, and while this paper was in preparation, two other publications have appeared on the result of the Bier method in ear cases in general. Stenger ("Die Bier'sche Stauung bei akuten Ohrenerkrankungen," *Deutsche med. Wochenschrift*, Feb., 1906, No. 6) not only used congestive hyperæmia according to Bier, but also employed suction stasis.

His cases consisted of 11 acute suppurating ears without accompanying mastoiditis and 7 cases with pronounced mastoiditis. Upon a series of chronic cases he is as yet not ready to report. Irrespective of the cause in the given case,

his results were complete cure in six cases whose duration previous to treatment had been three to four days, ear function re-established in about eight days after stoppage of the ear discharge, a result obtained usually in from nine to eleven days. Among the cases lasting longer before treatment was begun he obtained two cures in four cases. Suction stasis gave him favorable results in the other cases reported upon.

The other publication was that of F. Colley ("Betrachtungen und Beobachtungen ueber die Behandlung akute eitrige Prozesse mit Bier'sche Stauungs Hyperæmia," *Muench. med. Woch.*, Feb. 6, 1906), who reported the favorable outcome of one acute case treated according to Bier's method.

My conclusions, arrived at from the study of Bier's, Heine's, and Keppler's cases, is thus substantiated by the published histories of both Stenger and Colley, and additional evidence is given of the efficacy of induced hyperæmia when early applied, whether the given case is complicated or uncomplicated with mastoiditis.

Before proceeding to enumerate further indications and contra-indications, and the theory adduced from the results obtained, we will briefly state the technique for the application of the method, because both the indications and the contra-indications are only understandable when the technique is clear.

Technique.—The patients are put to bed after the performance of paracentesis, and receive about their neck the application of a rubber, slightly elastic, bandage, $1\frac{1}{2}$ inches in width (children $\frac{1}{2}$ inch), and suitably long to fit snugly around the neck. This is fastened at the ends by hook and eye. The pressure maintained must be sufficient to cause only a slight cyanosis of the face, but not so tight that pain is felt in the congested region, *which should be warm to the touch*. The regulation of this pressure is soon learned by experience. During the course of treatment the rubber stretches, and the bandage must be frequently inspected, and, if necessary, tightened.

The bandage is placed in position in the morning, and remains in place twenty-two hours, and after a pause of two

hours is again replaced. These are the directions laid down by Bier and Heine. I have aided the induction of hyperæmia of the head by raising the foot of the bed so that the patient's head shall be lower than his feet. I find that this aids considerably, and the bandage need not be applied as tightly as when this procedure is omitted. Where pus is evidently superficially over the mastoid region, Bier's method demands incision into the suppurating mass only large enough to afford egress to the purulent contents of the abscess; no packing is introduced into the cavity.

I found that, with the exception of the first few hours, the tight bandage was well borne, and its tightness not complained of even by young children. Two of my cases experienced some trouble during the act of swallowing, but this was obviated by the removal of the bandage during the ingestion of food. The relief of pain is noted very early by the patients, and Keppler found this so marked in some of his cases that he reports patients as asking for the replacement of the bandage because of recurrence of pain during the periods of intermission in the treatment. Earlier observers used the Bier constriction bandage exclusively, but I have combined it with the systematic douching of the ears at regular intervals. Discomforts even in the corpulent were not demonstrable to any who have employed the method.

Indications and Contra-indications.—The bandage so applied, the bed in proper position, a condition of hyperæmia is induced in the head by mechanical interference with the superficial circulation. It must therefore follow that patients who have cardiac lesions or kidney trouble are not eligible candidates for this treatment. An uncompensated heart already laboring under difficulties might be gravely affected if called upon to act against the increased resistance of the bandage, with its resultant capillary stasis.

To infiltrate the head tissues with the vital organs contained therein with an artificially produced œdema fluid containing products of metabolism in excess because of kidney lesions was thought unwise, Stenger also calling attention to this; hence both these pathological conditions, where evi-

denced by the physical or the urinary examination, are held as distinct contra-indications to the employment of the hyperæmic treatment.

Arteriosclerosis, with its non-elastic, hard arteries, is also considered contra-indicative; for the increased congestion of the head conceivably might produce a rupture of an overburdened cerebral artery, with disastrous results.

It follows therefore that the old and senile are not to be subjected to this treatment without undertaking greater risks than they would take under the usual lines of treatment, and in adults only those in whom a thorough physical examination reveals freedom from cardiac and renal diseases should hyperæmic therapeutics be tried. Among children and robust adults the best results are to be expected.

Stenger considers adenoids a contra-indication; his reasons for so doing are not clear, and in some of my cases, one with double involvement, adenoids and tonsillar hypertrophy were present, yet the cases demonstrated no unusual results from the effects of the bandage. Until more definite reasons are shown, I hold that the presence of adenoids does not constitute a contraindication.

Eliminating all cases wherein the given contra-indications obtain, and limiting the cases subjected to trial to those coming early under observation, I tried this method in the following cases, and while I realize that the material submitted is small, still the uniform results obtained when the given indications were kept in mind entitle me to report upon them and draw conclusions, so that others taking up this work will not waste valuable time along lines which already have shown no results, but rather cause them to investigate along the line herein outlined, so that my results will either be contradicted or substantiated.

Cases.—The material submitted to the hyperæmic treatment consisted of seven cases of acute otitis media purulenta with acute mastoiditis, and one case of distinct subperiosteal abscess. Among the cases there were two having both ears affected—that is, I used the method on ten acutely diseased ears.

Those reported as hospital cases were sent to the wards of

the Manhattan, Eye, Ear, and Throat Hospital by my chief, Dr. W. C. Phillips, for mastoid operation, and although some of them were not in such imminent danger of life that immediate operation was imperative, still these cases and those reported as private cases would all have been operated upon under the usual methods of treatment, because after the first day they exhibited all the usually accepted indications for operation. In this connection attention is called to the blood count of Case 8.

Of these cases all were completely cured except one — of which more hereafter, — the *membrana tympani* normal in an average of from five to six days.

The duration of all these cases prior to treatment was relatively short. Only once were symptoms such that the indicated operative measures could not safely be further postponed beyond twenty-four hours. This was a double involvement whose duration before coming under my care was a little over two weeks. This case then is also instructive as substantiating my claim that only when used early is the hyperæmic treatment of advantage.

Compared with the results obtained when cases usually clear up after mastoiditis, I find that the time required for the re-establishment of the ear function is decidedly shorter than when the usual treatment is employed.

The bacterial findings give no key to the results obtained; mixed infections yielded as readily to the treatment as the staphylococcic invasions, and it is noteworthy that the case operated upon evidenced the invasion of an extracellular diplococcus infection.

CASE 1.—Female, nine years of age, coming under observation at the Manhattan Eye Ear, and Throat Hospital on October, 3, 1905, complained of pain in the left ear, and a discharge which had persisted for three days. Examination revealed a perforation in the drum which was red, swollen, and pulsating, showing pus retention in the tympanic cavity. The canal was narrowed and mastoid tenderness was present. The existing perforation was enlarged, and a bacterial examination of the discharge made, showing a mixed infection. The patient was admitted to the wards by Dr. W. C. Phillips, and under my

direction the Bier bandage applied twenty-two hours daily. Hot hydr. bichlor. douches (1:2000) were administered. The temperature rose on the morning of the second day, but the ear discharge had already begun to look less purulent, and the operative measures were postponed, and the bandage treatment continued. The temperature curve steadily fell from the evening of the second day by lysis. The ear was entirely dry on Oct. 14th, and practically normal in appearance on the 15th, when patient was discharged. The mastoid tenderness was less on the second day, and absent on the fourth day.

CASE 2.—Male, aged five years, came under observation Dec. 30, 1905, because of acute mastoid disease demanding operation in the opinion of the family physician. A mastoiditis was found evidencing distinct tenderness on pressure over both tip and antrum. The drum was swollen, no landmarks visible, and the canals narrowed. Temperature 101.6° F. The child had complained of intermittent pain in the ear for about a week and steady pain for the last three days. Adenoids and hypertrophied tonsils were present.

Upon agreement with the family physician operative measures were postponed and the Bier hyperæmic treatment undertaken after a paracentesis had been made. The bandage was at once applied and was so well borne after the first three hours that its presence was unnoticed by the child. No interference with the act of drinking was manifest. Hot bichloride of mercury douches (1:2000) were given every four hours.

The temperature fell by lysis and the discharge became watery on January 4, 1906. The ear was dry on January 6, 1906.

CASE. 3.—Female seven years of age, seen December 30, 1905, at the Manhattan Eye, Ear, and Throat Hospital. The case presented a double mastoiditis, complicating acute otitis media purulenta which had existed four days before her appearance at the hospital.

Both drums bulging, swollen, and red. Canals narrowed, and on the right side a distinct sinking of the posterior superior quadrant.

No infiltrate on the mastoid regions demonstrable. Bacterial findings after paracentesis evidenced a mixed infection. Adenoids and hypertrophied tonsils present.

Case was sent to the ward by surgeon, the temperature on admission being 102.4° F.

The Bier constriction bandage was applied and well borne. Pain ceased to be complained of almost at once. The ears were regularly douched with hot bichloride of mercury solution.

The temperature fell by lysis, and the discharge changed from a purulent one to a discharge of watery character on the fourth day of treatment. Mastoid tenderness absent on both sides on the fifth day.

The child was discharged from the ward of the hospital on the eighth day of treatment, with both ears dry and hearing as well as before attack, as far as it was able to be proven.

CASE 4.—Male thirty-nine years of age. Physically in good health. A waiter by occupation. Appeared at the Manhattan Eye, Ear, and Throat Hospital, January 6, 1906, suffering from a severe pain in right ear.

He attributed his ear troubles to a cold. Examination gave a membrana tympani on the right side red, swollen, and markedly bulging, with a small perforation in the superior-posterior quadrant, from which a pulsating purulent thick discharge came away. A paracentesis was made to enlarge the perforation, and the patient instructed to douche the ear t.i.d. with hot bichloride of mercury (1:2000).

His condition improved for a time, but on the 18th of January the pain in the ear recurred. The drum again evidenced bulging. The superior wall of the canal showed itself sinking. The mastoid evidenced pain on pressure over antrum. No œdema was observable over the mastoid region.

A second paracentesis was performed and the same treatment given as at first, but the temperature rose to 102.2° F., and the case was sent to the wards for operation on the 19th of January.

The Bier treatment was administered, the bandage applied twenty-two hours each day. It was well borne, except for the inconvenience experienced by the patient during the taking of food, which required its removal during these times.

The bacterial findings showed the extra-cellular diplococcus. The character of the discharge at admission was thick, creamy, and profuse in amount.

On the second day of treatment there was less discharge and it was less creamy in character. The mastoid tenderness to

pressure hardly noticeable and the temperature began dropping.

January 22, 1906, found the patient very comfortable, discharge rather less in amount and muco-purulent. January 23d, discharge distinctly watery and temperature normal. The bandage was continued, however, and full diet permitted.

January 26th. Ears dry, drum normal, and light reflex present. The bandage was still continued in position for another day and the case returned to the out-patient department, where, when seen a few days later, he appeared as well as ever.

CASE 5.—Female, nine years of age, came to the Manhattan Eye, Ear, and Throat Hospital, February 6, 1906, suffering with pain in both ears, giving a history of pain in the ears, lasting for about two weeks on the left side and not clearly able to say how long on the right side.

Examination revealed a double acute mastoiditis complicating acute otitis media purulenta on both sides.

The right drum was red, swollen, and bulging. The canal somewhat narrowed. The left evidenced a perforation with a purulent discharge. Both mastoids were exquisitely tender to pressure.

Paracentesis performed on both sides to enlarge the perforation on the one side and to afford egress for the retained pus on the other.

Bacterial findings demonstrated an extracellular diplococcus as the invading organism.

The temperature on admission to the wards was 102° F. The Bier bandage was applied and the hot ear douches administered.

The next day no improvement being noted and the canals evidencing a further narrowing, the discharge from both ears showing no signs of being influenced by the treatment, and the patient's general condition unimproved, it was decided to operate, the temperature rising to the time of operation.

Both mastoids were opened in the usual manner.

The further history of this case is not of moment, regarding the Bier hyperæmic treatment.

CASE 6.—Male, twelve years of age, seen by me at the request of the attending physician, March 6, 1906.

The patient had complained of intermittent pain for a few days, which developed into an acute earache for two days prior to my visit.

Examination revealed the boy having had hypertrophied tonsils and adenoids, with mastoid tenderness very well marked over the right mastoid process. On this side the drum was red, swollen, and bulging, and the canal distinctly narrowed. Temperature 103.2° F.

Bacterial findings evidenced staphylococcus invasion. Hot bichloride douches were administered, and the Bier bandage applied for twenty-two hours a day. The bandage was well borne, except during the act of swallowing.

Immediately after paracentesis the ear began to discharge profusely.

The morning of the second day found the temperature still higher and no improvement in the character of the ear discharge, and after consultation with the attending physician it was decided to operate upon the patient that afternoon, but at an examination made in the afternoon the temperature curve had begun to drop, the discharge meanwhile taking upon itself a less thick and creamy character.

It was deemed safe to postpone the indicated operative measures and watch developments.

The following day the mastoid tenderness had entirely disappeared and the discharge was distinctly watery. Temperature normal.

On the fourth day of treatment the ear showed moist, and on the sixth day entirely normal in appearance.

CASE 7.—Male, aged six, came under observation April 10 1906, at the Manhattan Eye, Ear, and Throat Hospital, giving a history of having had a cold two weeks previous, and immediately following this, a discharge from the right ear which, after persisting two days, entirely disappeared.

Five days before appearance at the clinic there appeared a swelling behind the right ear, which has since gradually become larger and is very painful.

The otoscopic picture gives a drum normal, except for the transparent scar of a healed perforation in the inferior-posterior quadrant, lapping into the anterior-inferior quadrant.

The auricle stands off from the head and a swelling is evident behind it, extending upwards beyond its line of insertion, and down to a $\frac{1}{2}$ inch beyond the tip of the mastoid process. The swelling extended backward about two inches. The swelling

evidenced fluctuation and is exceedingly tender to pressure. The diagnosis of subperiosteal abscess following mastoiditis was made and the case sent to the wards.

Under anæsthetic a small incision was made, $\frac{1}{2}$ inch in length, in the line of the usual mastoid incision, deepened to the bone and through the periosteum. Large quantities of pus welled forth, and a probe introduced through the incision evidenced diseased bone underneath, although the fistulous tract could not be found.

A small wick of gauze was placed in the wound to provide drainage and an outer dressing applied.

The Bier bandage was then applied about the neck and left on for twenty-four hours when it was tightened and thereafter left in position twenty-two hours each day.

On April 14, 1906, four days after admission, the dressings were removed and the ear inspected. No pus was demonstrable in the wound. The swelling had entirely disappeared and no pain felt on pressure.

The patient was discharged April 18, 1906, cured.

When seen on May 5, 1906, there was no recurrence evident, and the patient seemed as well as ever.

CASE 8.—Female, aged five, came under observation on April 28, 1906, giving a history of having recovered from measles two weeks previously. Pain was complained of in the right ear, gradually becoming worse, and five days ago the ear began to give a purulent discharge. The temperature when first seen was 103° F.

The drum on the right side red, bulging, and the canal distinctly narrowed.

Bacterial findings evidenced mixed infection. The perforation was enlarged, and the case sent to the hospital, where the Bier bandage was applied. A blood examination was made by Dr. Zabriskie, the pathologist, with the following results :

Hæmoglobin	60 %
Erythrocytes	4,576,000
Leucocytes.....	15,111

Differential count:

Large mononuclear lymphocytes.....	7.0 %
Small " "	29.0 %
Polynuclear neutrophiles.....	59.2 %
Mononuclear leucocytes.....	1.0 %

Transitional forms	3.0%
Eosinophiles.....	0.8%

Plasmodia not present.

On May 4th, the discharge was very slight in amount, and watery. On May 6th, ear dry. The temperature rose to 101.8° on the second day, and then fell to normal, but on the third day again rose to 101.6°, after which it fell by lysis to normal, and remained so when patient was discharged on May 7th, cured.

Seen on May 10th apparently as well as ever.

The Dangers of the Method.—The application of the method, while simple in itself, and easy of employment, carries with it one danger which I must touch upon to complete this paper. In cases which do well under its employment the clinical picture changes rapidly, favorable progress—which ordinarily in the course of an acute otitis media would take some days, under the influence of the hyperæmic treatment will be reduced to hours. Therefore the strictest and most competent otological supervision is necessary to avoid missing the proper moment for surgical interference, should this become imperative.

What shall be the guide to determine when to proceed to operation? When the pus discharging from the ear does not change in character from a distinct creamy purulency to a more watery consistency within forty-eight hours, even if the mastoid tenderness be less—for it will always be found so under the influence of the bandage,—then operation is indicated.

If the fever curve, instead of falling by lysis from the end of the first day of treatment, either drops suddenly only to rise higher, or remains stationary, or rises from the first steadily higher, then, whether or not the patient's subjective sensations are apparently improved, operative interference is imperatively indicated. Should operative measures be delayed, there will be found upon the operating table a mastoid whose contents are in an advanced state of disintegration, with possibly the vital structures in it exposed to its purulent contents—a state of affairs wholly out of keeping with that which one would expect from the clinical picture of the given case (Heine reporting one such). Under no circum-

stances should the hyperæmic method of treatment be employed by others than trained and experienced observers capable of recognizing the approach of the danger zone in time to avoid its consequences.

Theory of Action.—Neither Heine nor Keppler formulates any theory to account for the results each obtained, nor is this to be wondered at, since they used the method promiscuously, but when the applicability of a therapeutical procedure is limited to acute suppurating cases, and we find that the results obtained seem to be uniform when the given indications are kept in mind, obviously some underlying principle is called into action to secure these results.

We know that interaction between invading bacterial organisms and the body tissues takes place whereby a substance is produced in the body tissues inimical to the bacteria (Park, "Nature of the Protective Defences of the Body," in his book entitled *Pathogenic Bacteria and Protozoa*, 1905). Conceivably this interactivity must take place in the region of the infected parts. Furthermore, through the action of the enzymes, or by reason of the production in the body of this bactericidal substance, it is conceded that body resistance is usually heightened during the first two hours, to a period from several days after infection. This heightened resistance must also be greatest around the seat of the lesion, and the damming back of the blood stream by the neck bandage, when applied early in the course of the disease, produces an artificial œdematous condition of the tissues, and brings more anti-bacterial fluids to act on the organisms present than would take place were no œdema produced.

In this connection it is interesting to note an experiment undertaken by Colley (*l.c.*). By bringing bacteria of known virulence into contact with œdema fluid from a congested limb the seat of a suppurative process, the author was able to prove that a distinct bactericidal action not present in serum from a normal limb was developed in the body fluids of a region subjected to congestive treatment.

Reading the result of Colley's experiment in the light

of our knowledge of body immunity, the explanation of the beneficial action of the Bier method of treatment becomes clear. The nature of the invading organism plays a small rôle, as shown by my cases. That increased resistance is produced and cures thus effected I have no doubt, because of the results of my observations.

Because the bandage application more nearly fitted my theory, it was exclusively employed by me; no incisions were made except into the *membrana tympani*. The production of hyperæmia by means of various suction cups, and after incisions over the mastoid, seems to me to be a contradiction of terms as advanced. In the latter case, an active hyperæmia is produced with attendant blood-letting, and while not disputing the results obtained, for we all know the good procurable from the application of leeches and the Wilde incision, yet when the incision is combined with suction cups, the results thus obtained are ascribable to the active blood depletion, and not to induced congestive hyperæmia. Furthermore, the chiselling of a hole down to the mastoid antrum and the application of suction—the performance of an incomplete operation (for such I term the method advanced by certain observers, among these Stenger, *Deutsche med. Woch.*, Feb. 8, 1896), with its attendant necessary anæsthesia—is certainly less satisfactory and less in accordance with surgical principles than the regular mastoid operation whose results we know and from which we have heretofore obtained satisfying results. If the patient's condition demands operation, then half measures are a useless waste of time and the method advocated a dangerous procedure.

In conclusion we summarize our observations of the Bier method for the treatment of otitis media acuta either with or without mastoiditis as follows:

1. If used early it will greatly increase the probabilities of curing the condition without resort to major operative measures.

2. In cases cured under its influence the re-establishment of ear function will occur quicker than under the usual line of treatment.

3. Its use by the inexperienced is absolutely dangerous.
4. Its employment should be limited to the young and the otherwise healthy.
5. Finally we submit that when the indications are kept in mind and when properly and intelligently used, induced hyperæmia will be found a measure destined, when its scope and limitations are better understood, to find a permanent place in otological therapeutics.

A CASE OF BRAIN ABSCESS FOLLOWING TRAUMATISM AND ACUTE MASTOIDITIS.
OPERATION. RECOVERY.

A CASE OF HYSTERIA SIMULATING BRAIN ABSCESS AFTER OPERATION FOR SECONDARY MASTOIDITIS.¹

By ALFRED WIENER, M.D.

SOME interesting features in these cases have led me to place them on record.

CASE I.—L. M., forty-three years of age, Italian by birth, married and has eight children. On April 6th was at work digging in a pit about fifteen feet deep, when suddenly the boards which are used for shoring up the sides of this excavation gave way, and struck him over the right side of the head. He fell to the ground, but appeared to be dazed only momentarily. As he arose it was noticed that he was bleeding from the right ear. He complained of feeling dizzy and of pain in his head. The patient was seen about three hours after the accident, during all of which time he was conscious and perfectly rational. On examination at that time the patient presented the following status: A man of normal build, with good muscular development. His inability to understand, when addressed in his native language, and his bewildered look at once attracted our attention, and a careful examination of the hearing was made. In the right ear, in spite of the bleeding and rupture of the drum, when spoken to in a loud tone he understood everything that was said to him. In the left ear the patient appeared to hear, but he could not be made to understand. After being spoken to several times he would repeat one or two words of a sentence and then look

¹ Reported before the Otological Section at the Academy of Medicine, New York, April 12, 1906.

bewildered. The tuning-fork tests were as follows. The Weber test was uncertain. The Rinne was negative in right ear and uncertain in the left. Bone conduction was good on both sides but somewhat lengthened.

Otoscopic examination.—Right ear: The canal was filled with dirt, oozing blood, and blood clots. After these were carefully removed, an oval and ragged-shaped perforation was visible in the posterior half of the tympanic membrane through which blood was still oozing.

Left ear: Nothing abnormal was noticed. An examination of the eyes did not reveal any nystagmus or other unusual condition.

The optic disks were normal; the deep reflexes were very much diminished even under re-enforcement. Not the slightest paralysis could be detected in any of the muscles supplied by the cranial nerves.

April 7th.—The condition was about the same as on the previous day, probably a little more pain in the head. The dressings which were removed were stained with blood, and there was blood still oozing from the canal. In addition a slight serous discharge was noticeable. The pain was localized over the antral region of the mastoid and the temporal regions of the skull. The pulse rate was 74 and the temperature was 99.2° F. A test made of the hearing showed the same result as on the previous day.

April 8th.—There has been less oozing of blood and more of the serous discharge. The pain comes on periodically.

April 9th.—The patient begins to understand simple questions when they are repeated several times in the left ear. Condition in the right ear is about the same; there is no longer any bleeding from the ear, but a large quantity of serous discharge.

April 10th.—The hearing and ability to understand have decidedly improved. There is less serous discharge from the right ear. There is still some pain over the antral region of the mastoid, especially to percussion.

April 11th and 12th.—The patient was feeling so well that he was allowed to sit up. There is no temperature. The pulse is 74 and the serous discharge has ceased.

April 13th to 20th.—He has been improving during all this time. His hearing in the left ear is now entirely normal. He is out of bed and around, and complains of nothing with the exception of the tinnitus.

April 20th.—He suffered an attack of acute tonsillitis, and on the following day complained of pain in the right ear. So rapidly did the infection spread that within thirty-six hours there were present all the symptoms, subjective and objective, of an acute otitis media purulenta. On the 22d the tympanic membrane ruptured through the thin scar of the old perforation, but the opening in the drum had to be enlarged to afford better drainage. About the same time the patient began to complain of excessive pain, especially in the ear and antral regions of the mastoid. On the 24th and 25th the discharge was free and abundant, but the canal was decidedly narrowed. On the evening of the 26th the pain had extended over the mastoid process, especially over the posterior border and antral regions. There was also some headache. The temperature was 102° and the pulse 80. The next day the temperature had arisen to 103° . The pain over the mastoid was severe, and extended over the entire right side of the head. The canal was so narrowed that the tympanic membrane was scarcely visible. An operation was advised, but no consent was obtained until the following day. On that day the temperature was 103.5° and the pulse 100. The patient was complaining bitterly of pain and had vomited twice. Both eyes were examined and the disks found normal.

The consent to operate having been obtained, the mastoid was opened. The whole base of the mastoid and antrum were filled with pus, granulation tissue, and broken-down cells. At the tip only very little secretion was present. As the mass at the base was removed it was found to extend right up to the dura of the middle fossa, showing that the roof of the antrum and tympanic cavity had been completely destroyed. The sinus was laid bare but found healthy to external appearances. On the dura of the middle fossa there was noticed some granulation tissue, marking the former site of the roof of the antrum and tympanic cavity. As sufficient was found in the wound to account apparently for the symptoms present in this case, it was thought wise not to do anything further. The wound was packed and the usual dressings applied.

On the following day the temperature dropped to 101° , but in the evening had again arisen to 104° . The pulse rate was 64 and the patient appeared to be suffering a great deal of pain.

There were alternating periods of slight delirium and depression. As the condition was practically the same on the following

morning, with a pulse of 60, and he had vomited several times, I decided to open the wound for exploratory purposes. Previous to this the eyes were again examined and found absolutely normal. Not the slightest disturbance in the region of any of the cranial nerves could be detected. The dressings were removed, and the sinus carefully examined and again found normal to external appearances. The granulation tissue over the dura covering the middle fossa was scraped, and it was found that the dura in this region was discolored. A narrow scalpel was passed through this region, and was immediately followed by a leakage of pus. The incision was enlarged, and the whole posterior portion of the temporo-sphenoidal lobe laid bare. An abscess, or rather an ulcerated area of brain tissue, representing a cavity of about one-half inch in depth and one inch in length was exposed. This was carefully washed out with a stream of normal saline solution, and then powdered with one part of iodoform to three of boracic acid. An iodoform gauze drain was placed therein and the rest of the wound covered with the usual dressings. The patient was put back to bed and the wound was dressed daily for a week. The patient showed daily improvement, and after two weeks I allowed the wound to close, and he made an uninterrupted recovery.

REMARKS: After a traumatism a patient suffers with hemorrhage from the ear, and amnesic aphasia in the ear opposite to the side of the lesion. Within a few days after the accident the hemorrhagic discharge is replaced by a serous discharge. This ceases after a few days and the patient is on the way to recovery, when he suffers from an attack of tonsillitis, followed by an acute otitis media purulenta and mastoiditis. The mastoid is opened, and sufficient appears to have been found to account for the cause of his symptoms.

Neither the temperature nor the symptoms appear to be appreciably affected by the operation; other serious symptoms appear, and on further exploration an abscess is found in the posterior portion of the temporo-sphenoidal lobe. This is opened and drained and the patient rapidly recovers. What conclusions were arrived at, and what was done in the way of treatment, is amply supported by the following consideration of the various features in this case.

During the first twenty-four hours it was impossible to establish the fact, whether this patient was suffering from a fracture of the skull or not. What especially strengthened the belief in such a diagnosis was the presence of hemorrhage from the ear, with amnesic aphasia. Hemorrhage alone from the ear, however, may result from a number of different causes: A rupture of the tympanic membrane, a fracture of the anterior wall of the external auditory meatus, a forcible separation of the cartilage of the external canal, a fracture of the posterior wall into the cells of the mastoid process, or, finally, a fissure or fracture at the base of the skull. Hemorrhage becomes a suspicious sign if there are connected with it certain other symptoms. During the first twenty-four hours there was some doubt in regard to the presence of a fracture of the skull, as I could not satisfy myself that there was present an amnesic aphasia in the left ear. However, a careful examination made on the second day left hardly a doubt in regard to its certainty. The patient seemed to make every effort to comprehend what was spoken into his left ear, but it was impossible for him to answer intelligently the questions put to him. He was suffering from word deafness. He could distinctly hear, as was proven by the tuning-forks and other tests, but would look at one in a bewildered and puzzled sort of a way, showing distinctly his lack of the power of comprehension. It was, therefore, not a case of simulation. As soon as the bleeding ceased, a contraction of the subdural clot, which was causing the pressure over the temporo-sphenoidal lobe, naturally followed, and the amnesic aphasia began to disappear. The presence of the *unilateral* aphasia is interesting. That such a condition may occur has been shown by the experiments of Ferrier. He has on many occasions after extirpation of the auditory area in one hemisphere, observed impairment of hearing in the opposite ear, and at the same time has not been able to detect the slightest impairment in the ear on the same side. This was exactly the condition in the above patient. He could hear every word that was spoken in a loud tone into his right ear, but could understand practically nothing that was addressed to him in his left ear, the one

opposite to the site of the lesion. In addition to the above positive symptom, there appeared, beside the oozing of blood, a serous discharge which at once made evident the diagnosis of fracture. One must bear in mind, however, that the simple discharge of a serous fluid does not always signify fracture. Von Bergmann has related a number of instances in which there had been a free serous discharge after injury to the skull, not due to fracture at the base. In cases reported by Prescott, Hewett and Gray, Marjolin and Wilson, the serous fluid came from the middle ear, as the base of the skull and the labyrinth were intact. Zaufal and Moos have called attention to the fact that, in the serous forms of otitis media, large quantities of serous fluid may come directly from the middle ear. Von Bergmann has come to the following conclusions in regard to the presence of a serous discharge from the middle ear. If it continues for some time, occurs at once, or within a few hours after the accident, it is positive evidence of fracture into the subarachnoid space. If it occurs after twenty-four hours, a basal fracture should be diagnosed if the reaction with silver shows a rich deposit. Absence of a serous discharge does not necessarily negate the presence of fracture.

With this positive evidence of amnesic aphasia, hemorrhage, and serous discharge, there was no longer any doubt but that a fracture had taken place. The amnesic aphasia was produced by the hemorrhage exerting direct pressure upon the posterior portion of the temporo-sphenoidal lobe. As soon as the hemorrhage ceased and the clot began to contract, the aphasia began to disappear. The patient had apparently recovered from the shock and the indirect symptoms produced by the accident, when he suddenly suffered an attack of tonsillitis, and almost immediately the middle ear became involved. This was followed by an acute mastoiditis and a direct extension of the infection into the middle fossa of the skull. This rapid course, with the formation of brain abscess, or, rather, ulceration of brain tissue, was favored by the lack of all resistance offered in the direct and easy pathway which the infection followed. I refer to the fracture in the skull and the tear in the dura, and the

remains of the old blood clot, which had probably not been entirely absorbed. The continuance of the symptoms after the opening of the mastoid, and at the same time bearing in mind the former presence of amnesic aphasia after the accident, strongly suggested an abscess of the brain. It led me to advise a second operation for the purpose of exploring the middle fossa in the region of the temporo-sphenoidal lobe. This resulted in finding the abscess, which after the proper treatment rapidly healed, and the patient made an uninterrupted recovery.

CASE 2.—L. K. is twenty-two years of age. Three months previous to the time that I first saw the patient, he was operated upon for an acute mastoiditis. This occurred on the right side and in an ear which had undergone middle-ear suppuration after scarlet fever. It had ceased to discharge about six months previous to the time that the acute condition above mentioned had taken place. It appears from what the patient told us, that as the suppuration in the canal continued after the above operation had been performed, and the wound behind the ear would not heal properly, a second operation was done. This time the wound back of the ear closed promptly, but the discharge from the canal continued. About two weeks previous to the time that he came to me the original wound in back of the ear again broke down, and there was some pain in the ear.

On examination at my office January 21, 1906, he presented the following status: The hearing in the right ear to ordinary conversation was about one and one-half feet. In the left ear conversation is heard at about seven inches. The tuning-forks showed Weber lateralized to the left ear, and Rinne negative on both sides. Bone conduction is good.

On otoscopic examination the right ear shows a canal which is very much narrowed and posteriorly filled by a small granulation. There is some secretion in the canal, but it is odorless. This granulation obstructs all view farther back. Behind the auricle can be seen the scar of the former operation, presenting two fistulæ. On probing, the one fistula leads in the direction of the antrum and the root of the zygoma. The other leads toward the tip of the mastoid process. The granulation in the canal was removed, and on the following day a small sequestrum about three millimetres in length was found in the canal and also removed.

Although I advised an opening of the wound behind the auricle, the family, in spite of all protests, persuaded me at first to employ milder measures. After three days the discharge in the canal ceased, and it appeared that the middle ear was responding to treatment. After ten days the patient began to complain of pain behind the auricle, in the region of his mastoid, and at the same time developed a temperature of 105° . I now refused to have anything further to do with the case unless I was allowed to clean out that mastoid. The consent was given and the patient was operated upon on February 8th.

At operation it was found necessary to cleanse the antrum and cells of the zygomatic root and to remove the tip. The sinus was exposed and found perfectly healthy.

On the day following the operation the temperature had dropped to normal and the pulse to 68. The patient no longer complained of pain; with the exception of a slight tenderness over the sterno-cleido-mastoid muscle, nothing unusual after a mastoid operation. With the exception of the pulse rate, which varied between 52 and 60 during the five days succeeding the operation, the patient appeared to be in excellent condition.

On the fifth day the dressing was removed, and nothing unusual noticed about the wound to attract my attention. About two hours after the dressing the patient complained of headache located especially over the top of his head. He refused his dinner and finally fell asleep. He had been sleeping about two hours when the nurse in charge noticed that the patient was becoming restless, and tossing about from one side of the bed to the other. Suddenly he began to talk in a disconnected manner, became very pale, and the pulse very weak. When spoken to he made no reply, and all efforts to arouse him were becoming more and more difficult. He became quite cyanotic, clammy to the touch, and his hands and feet were cold. All sorts of stimulation were resorted to, and when I finally reached the patient he had partially recovered from this condition of collapse.

An examination of the patient brought out the following: The patient was lying quietly in bed with his eyes closed, moaning at intervals and putting his hand up to his head. The pupils were widely dilated and responded sluggishly to light. An examination of the disks was negative. By watching the movements and play of the facial muscles no cranial palsy could be

detected. This was especially easy with the muscles of the eyeball, as he followed a light in whichever direction it was moved. The pulse rate was 50. The temperature was 100°. The heart, kidneys, and lungs were negative on examination. The deep reflexes were very much diminished. The dressing was at once removed, and not the slightest evidence found to account for this condition. When spoken to he made no response, but looked at one in an absent sort of a way. There was not the slightest evidence of any paresis. The sensation was carefully tested, and it was found that the patient was completely anæsthetic, with the exception of the soles of his feet and tips of his toes, within the palms of his hands and finger tips, and within the vestibule of his nostrils. The bowels and urine were emptied voluntarily, the nurse having been given instructions to look after these every four hours. The patient, however, gave evidence of his own accord later, when he wished to empty his bladder. The patient passed a restless night, complaining bitterly of pain on the top of his head, but recognizing no one and giving no response whatsoever to any questions. On the following day he was fairly quiet, complaining some of headache. The pulse rate varied between 52 and 60. The temperature was normal.

The area of anæsthesia remained the same. The deep reflexes were still very much diminished. About six o'clock that evening he suddenly, while being fed, began to talk and laugh and again appeared his natural self. When questioned about all that happened during the previous twenty-four hours he remembered nothing. One hour later I examined him and found everything perfectly normal.

His sensation had returned. The pulse rate, however, was still low, varying between 52 and 62. About nine o'clock in the evening he again relapsed into a sort of stupor exactly resembling the previous condition. He remained in this state until the following afternoon, when he regained his normal condition, and from that time on made an uninterrupted recovery. The pulse still remains at 60.

REMARKS.—The interesting feature in this case is the apparent collapse which occurred on the fifth day after the operation. A patient who has undergone two operations upon his mastoid, submits to a third operation in order to heal up two troublesome fistulæ, which have proven stubborn

to all treatment. During the five days following the operation the patient does apparently well. His temperature ranges between 98.2° and 99.5° , and he has no pain to speak of. His urine is normal in quantity and reactions. His pulse rate varies between 50 and 60. An examination of the heart at various times reveals it to be absolutely normal. On the fifth day the dressings are changed, and nothing unusual is noticed about the appearance of the wound. The patient is rather restless during the dressing, and rather upset by the pain produced by its removal. About two hours after the dressing he complains of headache, becomes restless, irritable, depressed, and passes comparatively into a condition of collapse. Stimulation is resorted to, and I see the patient shortly after he has partially recovered from this collapse. One of two things are at first suspected. Either a sudden hemorrhage within the cranial cavity, or the presence of a latent brain abscess which has suddenly made itself evident. The dressings are removed at once, but there is nothing present in the wound to account for the condition. The dura of the middle fossa and the sinus, both of which were exposed during the operation, on examination show nothing abnormal.

Hemorrhage was excluded for the following reasons: Instead of the rapid pulse, there was a very slow pulse, averaging about 50 beats to the minute. Instead of the frequent and irregular respiration, together with dyspnoea so often noticed in hemorrhage, it averaged between 15 and 19 to the minute, and was perfectly regular. There was no nausea or vomiting. The temperature, instead of being subnormal, was 99.2° . With these facts, and nothing evident in the patient to substantiate such a diagnosis, hemorrhage was excluded. The presence of a latent abscess of the brain was more plausible. First of all, this patient had been suffering from a chronic otitis media purulenta, off and on, since childhood. About six months previous to the acute attack, which necessitated an operation on the mastoid process, it had ceased to suppurate. We are well aware of the fact that the latent period of a chronic abscess varies much in duration. Gower says as long as from two to three months

to several years. Slight mental disturbances, usually of melancholic nature, have often been the only symptoms. This patient had been of a melancholy tendency for a long time, but it was due rather, as I found out later, to his increasing deafness. We know that such latent periods may end suddenly or gradually, due to the occurrence of an inflammatory œdema or softening around the abscess. What directed my attention at first toward the probability of brain abscess was the sudden onset of cerebral symptoms and a very significant sign of brain pressure—viz., the bradycardia. Nevertheless, the partial recovery of the patient, when I reached him, led me to make a careful neurological examination of the patient. As a rule, when the latency of a brain abscess is once broken, one expects the active symptoms to increase until death occurs. I was averse therefore to making any exploratory incisions until I could satisfy every reasonable doubt in regard to the presence or not of an abscess. Not the slightest paresis of any of the muscles supplied by the cranial nerves could be found. Neither was there any hemiplegia, paraplegia, or monoplegia. There was present not the slightest spasticity or rigidity in the muscles. The optic disks and blood-vessels showed nothing abnormal. The functions of the rectum and bladder were normal. The sensation was examined as far as it was possible. The patient was found completely anæsthetic on both sides of the body, with the exception of the soles of his feet and tips of his toes, the palms of his hands and finger tips, and within the vestibule of both nostrils. This at once aroused my suspicion, as such a distribution of anæsthesia would be difficult to explain. A lesion causing such extensive anæsthesia should undoubtedly present other focal symptoms. Furthermore, it would be difficult to explain the picture as presented in this case.

A careful inquiry was at once made into the family history of this individual. It was found that the mother was a highly hysterical individual, and that the patient was a boy with very little self-control, and not possessing much will power, and at times very wilful and at other times morose. It was decided to watch the patient for

twenty-four hours. The wisdom of this procedure was proven by what occurred on the following day. The patient again became conscious of his surroundings, recognized everybody about him, and was completely in the dark when questioned as to what had happened during the last twenty-four hours. His sensation was now entirely normal, but his pulse still retained its slow frequency. There was no doubt now that the condition was one of hysteria, and although he did lapse into a similar condition shortly afterwards, he was treated as an hysterical patient. He recovered from the second attack very rapidly, and from this time on made an uninterrupted recovery. The only persistent symptom is the bradycardia. We know that this symptom is sometimes produced by lesions in the nervous system where there is a direct involvement of the cardiac nervous mechanism. It has been noted in the early stages of meningitis, in apoplexy, and in tumors of the cerebrum and medulla. Finally there is a group of cases in which bradycardia is associated with a neurosis or is itself of this nature. I refer to hysteria, mania, and general paresis. In this individual it is certainly a neurosis, as no other evidence except of an hysterical nature has shown itself in connection with it.

THE TREATMENT OF PURULENT OTITIS BY CONGESTIVE HYPERÆMIA.

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THE favorable results obtained in acute inflammations of the extremities by the application of Bier's constriction bandage suggested a promising field for this method in analogous affections of the head. Accordingly, almost all inflammations and suppurations of the head and face applying at the Bonn Surgical Clinic or the Johannis Hospital within the last year and a half have been treated by congestive hyperæmia. This principle has been applied with special consistency, however, to the treatment of the most varied purulent inflammations of the middle ear, and it is a resumé of the observations in this field which is presented in the following treatise.

If we desire to determine the value or applicability of a new method, it is of importance not to make too narrow a selection for experiment, but to apply it even to cases which at first do not seem at all favorable. These considerations led us in the experimental study under discussion, and so all cases of aural suppuration, whether acute or chronic, uncomplicated or with mastoid involvement, were treated with the congestive hyperæmia. It is natural that complicated cases come into the surgeons' hands, and it will be seen that our cases were almost without exception complicated by disease of the temporal bone. But just such cases seem, if viewed in the light of the almost analogous

affections of the extremities, to offer a suitable field for this method. For if we can heal extensive and severe osteomyelitis of the long bones without producing necrosis, we should still more surely be able to count on similar results in the temporal bone. The comparatively small area of diseased bone, and, above all, the splendid blood supply of the head and consequent ease of applying hyperæmia, were all favorable to a good result. We shall see below how far these theoretic considerations were supported by practical experience, but here a few words as to the technique and physiologic action of congestive hyperæmia may not be out of place.

In regard to details of the mechanical procedure itself, only those points shall be considered which apply to inflammation and suppuration of the head. It is obvious that anatomic conditions limit the field of application of the congestion bandage, as the constrictor can only be fastened around the neck of the patient, a necessity which for a moment might cause some misgivings. This is entirely unfounded, however, as will soon be shown. The extraordinary vascularity of the head enables us to produce a marked degree of hyperæmia with relatively slight constriction, and pressure which would produce no symptoms of congestion at all if applied to the extremities, is sufficient, here, to cause a most intense reaction. These anatomic differences allow us to depart somewhat from the usual technique of Bier's treatment.

It is not necessary to encircle the neck of the patient with several tours of a constricting bandage, as a single elastic bandage is quite sufficient. In our cases a piece of ordinary cotton elastic or garter, about 3cm wide, was put round the neck and applied under slight tension. The garter should be almost as long as the circumference of the neck, one end fitted with a hook, the other with a number of eyes at various distances so that any degree of constriction can easily be obtained or the amount of congestion varied. The dosage of the procedure will be considered more in detail farther on, in the section on its mode of action.

The position of the bandage is often shifted, when used

on the extremities, in order to avoid symptoms of strangulation, but this is manifestly impossible in the neck, and generally unnecessary, if for the only reason that the slight pressure required is hardly sufficient to cause appreciable trouble. Still it is well to use certain precautions. The delicate skin of the neck should be protected by a single layer of a gauze bandage. More than one tour should not be used as this undoubtedly interferes with the uniform elastic pressure of the constricting band. The latter is fastened at the back of the neck, where the skin is toughest, and a bit of cotton or gauze padding placed beneath the hook and eye. The underlying gauze bandage should of course lie perfectly smooth. Daily rubbing with spirits of camphor may be used to toughen the skin. If in spite of these measures decubitus should appear, it does not necessitate an interruption of the treatment, as the skin lesion will heal with appropriate treatment with drying powders even under the constriction band. Still it may be as well to interrupt the constriction for a few hours each day, and to put a layer of cotton-wool under the elastic.

If the required degree of hyperæmia is not produced by the elastic, Henle's apparatus may be employed. This consists of a piece of rubber tubing connected with which may be bellows blown up by the patient. This is rather cumbersome, and, unless carefully fitted to the neck, is apt to fill up unevenly and produce painful, irregular pressure. It is particularly irksome at night. In special cases, as for instance where there are open wounds of the neck, necessary congestion could be produced by a number of tours of a flannel bandage, but this is hot and as a number of tours and a broad bandage are required, swellings low down in the neck would interfere with its use. As a matter of fact it would only be required exceptionally, and we have not been obliged to make use of the flannel bandage in a single case. The ordinary elastic will be found the most serviceable, but a new piece should be used every two or three days, as its elasticity rapidly deteriorates through sweat, etc., and fails to produce the necessary degree of hyperæmia.

In regard to the action of the congestion in affections of the head we can only repeat what has already been demonstrated for the extremities; as in all other diseases in which congestion treatment is indicated, the most striking effect is the relief of pain, which is usually prompt and reliable. Patients who have suffered with sleeplessness for nights, find rest, often after a single application. Large masses of inflamed glands, which were exquisitely tender, are rendered insensitive to fairly marked pressure by a short hyperæmization, and the patient, who may have been afraid to make the slightest motion of his head, has comparative freedom. The intimate causal connection between the congestion and the cessation of pain is shown most strikingly, however, by the recurrence of the latter symptom when the constriction is interrupted. Experiences of this sort popularize the method with the patients, who often of their own accord request the re-application of the constrictor before the time has come for it. Prompt relief of pain is the most striking feature of the procedure and serves as a reliable index of the right degree of congestion. If there is any complaint of increased pain, the bandage is certainly not lying as it should. It is generally too tight, and should be loosened, gradually and slowly however, even if the only discomfort be a sensation of pressure or fulness in the head. The statements of the patient are of the greatest value, especially to those who are still unfamiliar with the technique of the method, so that it is advisable to make the first applications in adults. After the entire clinical picture has been carefully studied in a few of these cases, it will be comparatively easy to interpret the objective symptoms which develop with congestion. Our experiences on this point may be of assistance. When the bandage has been correctly applied there will be some bluish-red flushing of the face and a somewhat swollen, sodden appearance.

In case the otitis be complicated by mastoid inflammation, a fiery red œdema develops behind the affected ear, but this is usually limited to the diseased area, in marked contrast to affections of the extremities in which the inflammatory redness often extends to the constricting band

after a single application. More extensive inflammatory reaction may also be met with in the case of large packets of diseased lymph-glands. A certain amount of œdema, which rapidly extends to the bandage, will also be met with, but this is a very variable symptom. In some cases the soft tissues of the neck hang down over the bandage like swollen sacs, in others the suffusion of the face, mentioned above, is the only sign of serous imbibition.

In regard to the length of time of constriction, we are in favor of long periods, averaging 20–22 hours daily. Of course it is necessary to individualize, and in case of marked œdema, the bandage may be removed an hour or so sooner. The excellent blood supply of the head will relieve the most extreme cases after a short interruption of the congestion, so that, as a rule, a period of 20 hours will not be too long. As the affection improves, the séances may be shortened, but it is well to continue for at least 10–12 hours daily, until some time after all inflammatory symptoms have disappeared. This need not prevent the patient from going to work, as no disturbances have been noted by us even in the presence of arteriosclerosis.

The influence of congestive treatment on the purulent process itself is almost as variable as it is in the case of the extremities. In one case a commencing suppuration is brought to a standstill or to absorption; in another, an acute pus-accumulation with the cardinal symptoms is changed into a cold abscess, more or less rapidly with a corresponding improvement in the general condition. In one of these cases, the pus was gradually changed into a serous fluid, but as it is our rule to incise all mastoid abscesses early, no further observation on this point could be made. Similar observations in regard to the extremities, especially in empyema of the joints, indicate that this is the usual result of the congestion treatment, the more so as the subsequent course of the cases, particularly of abscesses in the region of the head, after evacuation of the pus-suppuration lent color to this view.

In affections of the extremities, the application of the constricting bandage is usually followed almost immediately by

an increased production of thick pus, while after incision of abscesses in the region of the head, the same treatment leads to a prompt cessation of discharge. Even when large mastoid abscesses have been incised, the discharge generally becomes serous, and then in the course of a few days stops altogether. We have never seen gas-production or malodorous decomposition of the pus under the constricting bandage, but as these changes have occurred in hyperæmization of the extremities, although without any ill effects, a word of warning may not be out of place.

In regard to the influence of hyperæmization on inflammatory swelling and œdema, the experiences made in treatment of the extremities are accentuated. The inflammatory swelling at first increases, often doubling in size, and then grows smaller and eventually disappears without the constriction having been interrupted.

As to the treatment itself, this must be varied according as we have to deal with simple suppuration of the middle ear or with mastoid complications. In the former case, we may rely exclusively on the use of the constricting bandage, particularly if perforation has taken place and there is free drainage. If not, the perforation must be enlarged or another made at the appropriate point. In case no perforation has occurred, paracentesis is to be performed in the presence of the usual indications, with the hope of averting further complications by means of this simple procedure. If there be the slightest suspicion of pus-accumulation in the mastoid process, this should be incised at once. Even in case of a mistaken diagnosis, the small incision will do no harm, while in others this prompt action, together with hyperæmization, will save the bony structures.

At the beginning of our series these principles were occasionally sacrificed, solely for the sake of a more thorough study of the method, but it is by no means our intention to have our results, which were rather good, on the whole, serve to inculcate the principle of temporizing. Our standpoint is the old one, "*Ubi pus, ibi evacua*," and the sooner the better. As to the size of the incision, we have not yet decided. In general, we are in favor of small incisions, ex-

cept in the case of deep-seated gland abscesses. This point is, after all, of minor importance, compared to the necessity of avoiding all drainage and packing which are undoubtedly badly borne, and lead to permanent damage of the tissues, especially of the bone. The wound is simply covered with a sterile protective dressing, and freed of pus daily by vigorous expression. Suction apparatuses may be of use here, but we have not applied them. Bier's suction treatment has also been used of late in cases of suppurative otitis media.

A careful report of the cases seems particularly important, in view of the fact that the congestion treatment contravenes long-established theories as to the interpretation and treatment of acute suppuration. Furthermore, a detailed account of these twenty observations may dispel some false impressions as to our method. Our data may be divided into acute and chronic cases.

A.—ACUTE CASES.

CASE 1.—Aged ten. Pain, A. S., four weeks ago, lasting two days, and ceasing after yellow discharge appeared. Suppuration continues, and there is now severe pain in the left side of the head. S. P.: Head tilted to the left. Pain on manipulation. Upper wall of canal swollen and prolapsed. Drum red and swollen. Small perforation in the lower half, with profuse mucopurulent discharge. Extensive redness and swelling over the mastoid. No fluctuation. Pain on pressure. T. 37.9°. Congestive hyperæmia applied 22 hours daily. II, 20, '05. Constriction well borne. Face bluish-red. Mastoid tenderness almost gone. Signs of inflammation unaltered. Oedema more marked. No fluctuation. Canal cleaned daily and closed with a sterile tampon. T. normal. II, 25. Pain gone. Redness and swelling over the mastoid have disappeared. Discharge less. T. normal. III, 4. No discharge. Mastoid appears normal. Constriction stopped. III, 8. Patient discharged. Drum pale. Handle of malleus visible. Site of perforation cannot be made out. Hearing normal. Treated eighteen days.

CASE 2.—Aged thirty-one. Repeated discharge, A. S., in the last few years. Four weeks ago, fever and intense pain, A. S. Signs of inflammation disappeared a few days later when thin yellow pus began to run from the ear. This continues. For

two weeks, boring pain in the head, left side. 15, V, '04. S. P. Marked swelling of soft parts about A. S., which stands off from the head. Intense redness and œdema over the entire post-auricular region. Marked tenderness. No fluctuation. L. ext. aud. meat. full of thick, foul-smelling pus. Upper canal wall œdematous and prolapsed. Drum red and swollen. Large perforation below. H., A. S. o. T. 37.6°. Congest. hyperæm. with Henle's tube, twelve hours daily. No other treatment. V, 16. Mastoid tenderness much less. Discharge unaltered. Pus wiped away frequently. V, 25. Mastoid pain becoming steadily less. When the bandage is on, there is little pain on pressure. Signs of inflammation less marked. Redness and swelling almost gone. Discharge decidedly less profuse. Drum not swollen. Perforation persists, with pus discharging. VI, 2. Complete cessation of discharge for a few days. No evidence of mastoid affection. G. C. good. VI, 13. Discharged. Cured. Constriction to be worn for a few days. Under treatment four weeks. XII, '04. Feels well. Drum normal. No trace of the old perforation. Hearing perfect.

CASE 3.—Aged twenty-one. Influenza two months previously, in the course of which intense pain developed, A. S., disappearing soon after with discharge of bloody serum. A few days ago intense pain came on again, with marked tenderness over the mastoid. S. P.: A. S., stands off. Redness and œdema over left mastoid, which is exquisitely tender. No fluctuation. Marked sinking of upper canal wall hiding upper part of drum, which is dull and swollen. T. 37.9°. Cong. hyp., twenty-two hours daily, with elastic band, as usual. III, 14. T. to-day rose to 38.1°. Mastoid swelling more marked, with definite fluctuation. Incision made over mastoid, 3 cm. long. After splitting the periosteum a small amount of sero-pus escaped. Wound covered with a sterile dressing. Cong. hyp. reapplied two hours later. III, 15. Marked cyanosis of face. Usual reactive redness and swelling over the mastoid. Dressings only slightly moist, but pus appears in the wound on pressure. Drum still bulging. Paracentesis. Fair amount of purulent fluid escaping. T. normal. III, 17. Pus still escapes from the ear. Region of wound still red. On pressure, pus oozes out of incision. III, 26. No discharge for a day or two. Operation wound healed. No pus on pressure. No inflammatory reaction. Constriction stopped. IV, 14. Discharged. Cured. Ear and

mastoid appear normal. V. at 12 m. Under treatment four weeks. VII, 1. Patient well and able to work.

CASE 4.—Aged thirteen. Stubborn influenza, beginning four weeks ago, with severe pain, A. S. Spontaneous perforation a few days later, with profuse purulent discharge. Soon after, fever came on and a tender swelling appeared behind the ear. Cold applications and daily syringing failed to relieve. I, 23, '05. Profuse discharge of foetid pus, A. S. Drum red and swollen. Small perforation in posterior quadrant. External meatus narrowed to a crevice by prolapse of upper wall of canal. Auricle stands off. Mastoid swelling size of a hen's egg, with marked fluctuation. Skin red and thinned. T. 37.6°. Treatment: Mastoid abscess opened by an incision at least 1 cm. long, discharging an unexpectedly large amount of pus. The rest expressed mechanically. Dressing forceps introduced shows bare bone, which is discolored, grayish-white. Wound not packed, but covered with a loose sterile dressing. Sterile tampon introduced into ext. canal. Cg. hyp. started two hours after operation. I, 24. Bandage has been worn twenty-two hours. Usual cyanosis of face. Free discharge of foetid pus. Dressing only slightly moist. On pressure there is only slight oozing of sero-pus from the wound, in spite of the large cavity. Neighborhood of incision shows the usual reactive redness and swelling. T. normal. Pus in canal wiped away several times daily. Wound cavity emptied by pressure once a day. Cg. hyp. twenty-two hours daily. I, 30. Discharge less. Inflammatory signs over the mastoid very slight. A few drops of pus can still be pressed out of the wound. II, 7. Since two days total cessation of discharge. Mastoid wound closed. Cg. hyp. reduced to twelve hours daily. II, 13. No constriction since a day or two. Drum normal. Mastoid not sensitive. Small linear scar. Hearing perfect. Discharged. Cured. Treated three weeks.

CASE 5.—Aged five. For 10 days, marked pain, left side of head, radiating to vertex. Since two days pain settles in the region back of the ear. Tender inflammatory swelling over mastoid since yesterday. XI, 19, '04. S. P.: A. S., stands off. Auricle red and swollen, also mastoid, which is very tender. No fluctuation. Drum dull, details invisible. No discharge. T. 38°. Cg. hyp. 10 hours. XI, 22. Exploratory paracentesis. Drum seems much thickened. A little blood, no pus escapes. Redness and swelling behind ear. Less pain. No fluctuation.

XI, 24. Decided fluctuation over mastoid. G. C. unchanged. Tampon in canal soaked with blood. Abscess incised. Cut 1 cm long over antrum. After splitting the periosteum, about 1 dram of thick yellow pus escaped. Probe shows disintegrated bone in the mastoid process. Pus pressed out. Wound lightly dressed, not packed. Two hours later, a light dressing applied and Cg. hyp. started. XI, 26. Dressings slightly soaked. Ear tampon dry. XI, 27. T. 38.4° , due to premature closure of wound and retention. Wound opened. Pus swells up. Pus in external canal. XI, 30. T. normal for several days. No discharge. XII, 2. Wound closed. No retention. Slight œdema over mastoid. No tenderness. XII, 10. Normal conditions. XII, 23. Discharged. Cured. Treated four weeks.

CASE 6.—Aged ten months. Child has been ailing for some time. Three weeks ago, slight purulent discharge, A. D., increasing in the last few days. With fever. X, 24, '04. S. P.: Fœtid discharge, evidently old, A. D. Drum red and bulging. Small perforation below mastoid red and swollen, tender and fluctuating. Cg. hyp. 22 hours daily. X, 27. Child stands constriction well. Œdema of mastoid more marked. Inflammatory redness less. Tenderness almost gone. The abscess has become cold, but as it has not decreased in size, an incision is made 1 cm long, letting out a large amount of thick pus. Mastoid process and neighboring portion of the squama bared of periosteum, discolored, grayish-white; no fistulæ. Pus expressed. Wound lightly dressed. 2 hours later, Cg. hyp. Canal wiped out daily. X, 28. Dressing soaked. Some oozing of sero-pus on pressure. T. normal. X, 30. Discharge much less. No odor. Oozing on pressure now of clear serous fluid. T. now 39.2° in P. M. Coryza and epiphora. No symptoms of intracranial complication. Measles developed and was complicated by bronchopneumonia, in spite of which the Cg. hyp. was kept up for twelve hours daily. XI, 28. Discharged. Cured. Treatment four weeks.

CASES 7, 8, 9, 10.—Purulent otitis media of a few weeks' standing, with evidence of mastoid involvement. Incision of abscess in several instances. All cured after three to four weeks.

B.—CHRONIC CASES.

CASE 1.—Aged seventeen. Mastoid operation some time ago. Relapse of mastoid pain. VI, 27, '05. Swelling and redness

over right mastoid. No fluctuation. Tenderness marked. Cg. hyp. six hours daily. VII, 18. Mastoid now normal, no abscess having developed. No tenderness. Discharged. Cured.

CASE 2.—Aged sixteen. Purulent discharge, A. D., at times from early childhood, constant since several months ago. III, 9. '05. S. P.: A. D., canal filled with foul-smelling pus. Large polyp hanging from upper wall, hides drum. No mastoid changes. T. normal. Cg. hyp. 22 hours daily. Canal wiped out daily. III, 15. Discharge less. Polyp about half original size. Drum visible. Site of perforation can not be made out. Canal walls very red and swollen. IV, 3. No further change in polyp, which is snared off. A few drops of pus in the canal. IV, 17. Practically no pus discharge. No swelling of wall. Small granulation at site of polyp. Touched with chromic acid. Discharged. Cured.

CASE 3.—Aged three. Discharge, A. D., since infancy. Pain, redness, and swelling behind ear since a few days. VIII, 16, '04. Profuse discharge of foul gray pus, A. D. Painful and tender fluctuating area, red and swollen, behind ear. Large polyp hiding drum. T. 39.4°. Cg. hyp. twelve hours daily. VIII, 18, '04. Fluctuating swelling now covered by normal skin (cold abscess). No tenderness. T. normal. Incision, 2cm long over swelling, frees a large amount of fœtid pus. Mastoid bare of periosteum. Bone discolored, grayish-white. No fistulæ. Dressed. Two hours later, Cg. hyp. XIII, 25. Discharge, always slight, now stopped. Wound closed. No pus on pressure. No tenderness. Less discharge from canal. Streptococci found in smears and cultures of the secretion. VIII, 27. Wound cicatrized. Slight secretion from canal. Patient taken home. In Jan. 5, 1906. S. P. shows the polyp much shrunken. Drum shows a large perforation taking up almost the entire pars tensa. Pus still discharging from tympanic cavity. No signs of mastoid disease.

CASE 4.—Age one and a half years. Discharge, A. S., since one year. Painful swelling behind ear since a few days. VIII, 4. Profuse fœtid discharge, A. S. Canal wall and drum red and swollen. Site of perforation can not be made out. Post-auricular redness and swelling, fluctuating and tender. Incision 1cm long. Free escape of thick pus. Rest pressed out. Dressing, two hours later. Cg. hyp. twelve hours daily. III, 10. Wound closed. Soft tissues appear normal. Fluctuation gone. No pus on pressure. Discharge from ear less. Child sent to out-patient dept. XII, '04. S. P.: large perforation in anterior segment

of drum. Discharge now more copious. G. C. bad. No evidence of mastoid involvement.

CASE 5.—Aged eighteen. Profuse discharge, A. D., for three months. Painful swelling behind ear in last few days. V, 7, '04. P. X. Canal, A. D., filled with fœtid pus. Intense redness and swelling of wall completely hiding drum. Post-auricular region œdematous and inflamed. Fluctuation near the auricle. Intense tenderness. T 39°. Incision, 1*m* long in abscess. Free discharge. Bone found denuded over a large area. Wound expressed and covered with a sterile dressing. Cg. hyp. twelve hours daily. VI, 1, '05. Swelling behind ear almost gone. Fistula discharging pus at site of incision. Probe meets rough bone. Discharge from canal has been wiped away daily and is less. VI, 8. Condition about same. Mastoid operation. Extensive cholesteatoma. Radical exenteration. Cure.

CASE 6.—Aged fifteen. Pus discharge, A. S., since infancy. Lately, after influenza, intense pain left side of head. A. D. radical operation some years ago. I, 21, '05. A. S. Thick pus running from canal. Upper wall so red and swollen that drum cannot be seen. Œdema and inflammation over antrum. No fluctuation. Inflamed area hot and tender. T. 38°. Cg. hyp. 20 hours. I. 30. At first the inflammatory symptoms retrogressed, but since a day or two there is increasing evidence of mastoid abscess formation. Incision, hardly 1*cm*. long. Large amount of bloody pus evacuated. Probe reaches a large cavity in the bone. Constriction kept up. Drum found to be almost completely destroyed. Epidermization and granulating areas seen in the tympanic cavity. IV, 8. No improvement to date under Cg. hyp. Mastoid opened, and found full of cholesteatomatous masses. Large cavity. Bone in this region remarkably soft spongy, and vascular. Radical operation. Stacke flap. Packed and sutured. Discharged. Cured.

CASES 7, 8, 9, 10.—Chronic purulent otitis, or acute exacerbations with evident mastoid involvement of several months to one year's standing. Cg. hyp. of no avail. Radical operation in three cases followed by cure. Death from double lobar pneumonia in the fourth, after about six weeks under Bier's treatment without any improvement in aural condition.

The case-histories reported above afford further proof of the excellent results to be obtained with Bier's treatment.

As in the case of the extremities, the more acute the inflammation the more successful the treatment. Of our cases of acute mastoiditis every one was cured, and all were cases which had been referred to us for the usual operation, and presented without exception the classical symptoms indicating surgical interference.

Any one who has had much experience with mastoid operations knows how variable the anatomic and pathologic conditions are which he finds on opening the process. In a case in which all the symptoms point toward an abscess in the mastoid no pus at all may be found, and again fistulæ and sequestra are found where swelling of the soft parts was the only indication of bone disease. Considering these difficulties in the pathologic diagnosis, we are not justified in drawing conclusions from external conditions as to the changes within the mastoid cortex. In our cases, this would lead only to vague conjectures, as in the majority of cases the incision was so minute as to reveal practically nothing of the surface of the bone. A careful study of the case-histories will certainly impress the reader with the fact that the most varied conditions and degrees of inflammation were included in our series.

A word must be said in regard to the small incisions which were used in a number of cases. Years ago a similar cut, the Wilde incision was extremely popular, but in the course of time this simple procedure has practically been abandoned by aural surgeons, or is used at best in an occasional case of doubtful nature. Koerner doubts whether acute bone suppuration can ever be reached by the Wilde incision. It may possibly be of use in mastoiditis in infants, but here we do not necessarily have to deal with bone suppuration; on the contrary, in the majority of cases there is an empyema of the antrum which may break through a patent mastoideo-squamous fissure and simulate bone disease. In such cases Wilde's incision merely takes the place of spontaneous perforation through the skin, and, like nature's method, may lead to recovery. In the cases of reported cure in adults, Koerner claims that there was not sufficient proof of actual bone disease. There may have been merely an exudation,

capable of resorption, in healthy bone cells, and it is by no means out of the question that even grosser errors of diagnosis were made, in which subcutaneous abscess, periostitis, or broken-down lymph glands in furunculosis of the external canal wall were mistaken for mastoid suppuration. Still it must be admitted that other authors have observed healing of marked mastoid abscess after Wilde's incision, although these are very exceptional cases, which according to Politzer prove only that purulent bone affections in the mastoid process may under certain circumstances heal without operation. They prove nothing as to the healing effect of the incision.

After all, our small incisions can hardly be likened to the Wilde incision, which is a rather large cut intended to act primarily by abstraction of blood,—an indication which was not generally met by our simple puncture. The main object was merely to prevent a spreading of the suppuration and to evacuate the pus, as is done in similar osteomyelitic abscess of the extremities in the course of Bier's treatment. This view of the action of the small incision suggests the determining effect of the hyperæmization which is proven positively by our results in those cases of undoubted mastoiditis in which absolutely no other treatment whatever was used. The results of the congestive treatment in the chronic cases were not exactly brilliant, and cannot be compared for a moment with the results in the acute cases, yet even here a careful analysis will throw a rather different light on our failures. If dead bone has already been sequestered, or cholesteatoma is present, nothing can be accomplished with congestive hyperæmia. This undeniable fact excludes three of our chronic cases (5, 6, and 7) in a critique of the procedure. These cases were only treated because an exact diagnosis had not been made. Still, of seven chronic cases, only two were cured. Of these, one was a relapsing mastoiditis subsequent to operation. It is difficult to say what conditions were present here, so that the case does not offer much of a basis of criticism. The other case was one of chronic purulent otitis with formation of a polyp, after the removal of which a cure soon took place under congestive

hyperæmia, but this case, too, does not prove much, as spontaneous healing of aural discharge occasionally takes place after the removal of such growths. The uncomplicated middle-ear suppurations offer no criterion, as they, too, often get well, without any operative interference whatever, under ordinary local asepsis. The crucial question is whether we can cure chronic mastoiditis by Bier's method. In that event we shall certainly be able to count on a spontaneous cessation of the remaining, uncomplicated discharge from the ear. Cases 3 and 4 seem to speak in favor of this possibility. These were both decidedly chronic cases which came under observation with mastoid abscess. The latter were treated exactly as in acute cases and were rapidly cured. It is to be regretted that the children were taken home before the residual otitis had completely ceased, but repeated careful examinations by a specialist long after showed that there was no trace of the old mastoid affection. All that remained was a discharge from the middle ear, and this uncomplicated suppuration could undoubtedly have been cured without any operative procedures. Unfortunately these cases were lost to observation. Cases 7 and 8 may serve to uphold this view, but in one there were reasons why the congestion treatment could not be kept up, while in the other the previous history pointed to cholesteatoma, and indicated an early operation. The condition of the bone as found on opening the mastoid is worthy of notice. It appeared extremely vascular, owing to the continued hyperæmia, and in most cases, particularly in cholesteatoma, there was a noticeable and sharp limitation of the diseased tissues. The after-treatment seemed to be decidedly shortened by the previous Bier constriction.

All in all, the results in chronic mastoiditis are hardly encouraging, and it is a question whether we should advise further trials of the procedure in this particular field. Experience in chronic osteomyelitis of the extremities indicates that there may be certain cases of chronic mastoid disease which will be benefited—those in which there is no sequestrum, but an abscess or granulating cavity.

A warm recommendation of the procedure in cases of

acute mastoiditis is only natural in view of the excellent results obtained by us in the first series of ten cases. Others will undoubtedly obtain as good results with the method, and accomplish what has so far been possible only with the use of hammer and chisel.

SIMPLE AND RADICAL MASTOID OPERATIONS UNDER LOCAL ANÆSTHESIA.

BY DR. HEINRICH NEUMANN, VIENNA.

Abridged Translation, by Dr. M. J. BALLIN, New York, from *Zeitschr. f. Ohrenhkl.*, Vol. LI., 1906, German Edition of these ARCHIVES.

SCHLEICH, in 1894, stated that the mastoid operation could be readily performed under local anæsthesia, unless sclerosis and eburnation of the mastoid cells were marked. This method has since been tried with varying success by many operators. Hoffman, of Dresden, at the Fifth Congress of the German Otological Society, reported that he had used Schleich's anæsthesia in a number of cases of operation on the mastoid process, but that he had again abandoned this method because working with the chisel and bone forceps was found to be unpleasant to his patients. In a patient who was apparently of a nervous temperament, headache lasting several days and attacks of dizziness were observed after the operation.

In 1897 Noack (*Münchener medizin. Wochenschr.*, p. 135) published his experience with the Schleich local anæsthesia. He states: "Contrary to Schleich's expectations, I found in several operations on the mastoid process that the infiltration alone was not sufficient, as I was not able to bring about anæsthesia in the deeper layers of the bone, and had, when working in the tympanic cavity, to resort to the use of chloroform. I hardly believe that this method can prove entirely satisfactory in cases in which there is an extensive diseased condition, as there are areas supplied by nerves which are not reached by the infiltration of the periosteum."

Braun¹ reports that he operated upon frontal and maxillary sinuses under Schleich's local anæsthesia.

Friedländer² confirms the statements of Schleich, that the periosteum of the long bones can be made œdematous and anæsthetic with surprising ease, whereby the entire bone becomes anæsthetized. If the marrow is also made insensible by infiltration through a small trephine opening in the bone, one is able to saw, chisel, and break off compact as well as spongy bone without any pain to the patient.

In 1901 a report was published from our clinic. My colleague, Dr. Alexander, performed eleven cases of mastoiditis under Schleich's local anæsthesia. A number of these cases showed surprisingly good results, as the analgesia was almost complete. In other cases, while working in the deeper parts, especially in scraping out the antrum, an occasional pain was experienced, which immediately necessitated another infiltration. In all eleven cases, however, the operation could be finished under local anæsthesia, and the cases were discharged from the clinic as cured.

Alexander also tried to perform the radical operation under Schleich's anæsthesia, and operated upon two cases by this method. In his report, however, he states that this method is inadequate, as it was not possible to detach the posterior wall of the external meatus or to work in the tympanic cavity without causing pain.

In addition to the infiltration anæsthesia, Schleich recommended the use of the ethyl-chloride spray as a local anæsthetic in the opening of the mastoid process in the acute cases. Scheibe, of Munich, reported at the Fifth Congress of the German Otological Society (*Arch. f. Ohrenheilk.*, vol. xli., p. 72) that he had operated upon six cases with this form of anæsthesia. It is, however, necessary for the success of the method that the sensitiveness on pressure over the mastoid process be not too marked. His suggestion was not followed.

Thies, of Leipzig (*Arch. f. Ohrenheilk.*, vol xli., p. 73), used

¹ "Über Infiltrationsanaesthesie und regionale Kokainanaesthesie," *Centralblatt für Chirurgie*, 1897, No. 17, p. 482.

² "Erfahrungen über die Lokalanaesthesie nach Schleich." *Wiener klin. Wochenschr.*, 1900.

a 1 per cent. solution of cocain. He injected this into the soft parts of the mastoid process of a girl eight years of age. The incision in the skin and bone was somewhat painful; the opening up and scraping out of the bone and the removal of considerable granulations and pus were carried out to the end without causing much annoyance to the patient. How long Paul Reclus (*L'anæsthésie localisé par la cocaine*, Paris, 1903) has used the injection of a 1 per cent. solution in operating on the mastoid process I could not learn from the literature. Reclus carries out his method in such a way that he first anæsthetizes the skin by intracutaneous injections, and then injects subperiosteally, or makes subperiosteal injections before the incision in the skin. He waits about five minutes after making the injection; it is not stated whether, in his case, the antrum is opened.

Through the introduction of adrenalin, the action and use of cocain have been greatly enhanced. After cocain and adrenalin had been used in combination by many operators, and found to be of value, the paper of Braun¹ appeared, in which he is the first to recommend and establish the use of this mixture. He showed that the impaired vitality of the tissue increases the local action of the poison. This impaired vitality may be obtained by an interruption in the circulation of the blood from constriction, by diminution of temperature, and finally by the local application of adrenalin. Simultaneously with the increased local action of the poison the general action diminishes as its absorption becomes less rapid.

Braun showed that cocain and adrenalin injections into the tissue anæsthetize beyond the zone of direct infiltration, and at the same time the effect of the cocain lasts much longer. The statements of Braun were confirmed by the experiments of A. Exner² and Sörms.³ The latter showed that the

¹ "Über Einfluss der Vitalität der Gewebe auf örtliche und allgemeine Giftwirkung lokalanaesthetisierender Mittel und über die Bedeutung des Adrenalins für die Lokalanästhesie," *v. Langenbeck's Arch.*, lxi., Nos. 1 and 2.

² "Über die durch intraperitoneale Adrenalin-injectionen verursachte Verzögerung der Resorption von in den Magen eingeführten Giften," *Arch. f. experimentelle Pathologie und Pharmak.*, vol. 1., p. 313.

³ "Experimentelle Untersuchungen über die Gefässwirkung von Suprarenin in Verbindung mit örtlich anaesthetisierenden Mitteln," *Deutsche Zeitschr. f. Chirurgie*, lxxiv., p. 63.

contracting action of the suprarenin on the blood-vessels is affected the least by cocain, while it is somewhat reduced by eucain and tropacocain.

On March 5, 1905, a paper by Heidenhain¹ appeared, which induced us to undertake our experiments. Heidenhain demonstrated that 1cc of a $\frac{1}{2}$ to 1 per cent. solution of cocain to which 1-2 drops of a 0.1 per cent. solution of adrenalin had been added, would in the course of half an hour anæsthetize the cutis, subcutis, and fascia, which would last several hours. A 1 per cent. solution was better than a $\frac{1}{2}$ per cent., acted quicker, and extended over a larger area. If this solution was injected beneath the scalp on the bone, within half an hour not only the scalp but also the underlying bone became totally insensitive to pain down to the dura, and apparently this also.

He performed two trephining operations without pain by injecting 10cc of a $\frac{1}{2}$ per cent. solution of cocain to which adrenalin had been added. When using cocain he follows the directions laid down by Reclus. One can in this way, according to the statements of Reclus, use cocain up to 20cg without producing toxic symptoms. We shall return to a consideration of these directions, which I also follow very closely, later on.

Heidenhain regrets (p. 252) that he has recently had no case arising from the middle ear, and says: "In all probability it may become feasible to carry out the radical operation in chronic, and perhaps even in some acute, cases with Braun's local anæsthesia to the utter satisfaction of the physician and patient, by which I mean to say that the physician may work unconcerned and undisturbed, and the patient will not complain of pain. The very fact that the field of operation is so limited allows the hope to use less of the fluid, and therefore to employ the stronger and more powerfully-acting 1 per cent. solution of cocain."

At the meeting of the Austrian Otological Society held on April 25, 1904, I was able to present a case in which I

¹ "Trepanation unter Lokalanæsthesie und Trennung der Galea ohne Blutung," *Zentralblatt für Chirurgie*, p 249.

opened up the mastoid process under complete anæsthesia according to the suggestions laid down by Heidenhain, by subperiosteal injection of a mixture of a 1 per cent. solution of cocain and adrenalin.

Since that time I have employed this method in a large number of acute cases, and Professor Politzer and Dr. Alexander have also operated a large number of cases in this manner. By the combination of subperiosteal injection in the external meatus (see my paper on "Hammer Ambos-Extraktion in Lokalanaesthesie," *A. f. O.*, vol. lxiv), I was able to carry out the radical operation under local anæsthesia without any pain, and there have been up to now about forty radical mastoid operations performed by this method.

I have also opened up maxillary and frontal sinuses by this method without causing any pain.

To determine the action of subperiosteal injections, I undertook a number of experiments on animals (rabbits) in which I injected into the periosteum of the frontal sinus the above-mentioned mixture, to which I added a few drops of gentian-violet, to give it a deep violet color. Upon opening the frontal sinus, it could be seen that the injection had really taken place subperiosteally. The entire surface of the periosteum next to the bone was of a deep violet color, the cuticle layer of the bone was also of a slight violet tinge, and as I opened the frontal sinus I could clearly see the violet color in the blood-vessels of the mucous membrane. In like manner I have also convinced myself in the radical operation on the human ear in vivo that the interior of the mastoid becomes tinged through the subperiosteal injection. This injection acts in such a way that a portion of the fluid finds its way into the interior of the mastoid process through the bony canals and lymphatics, where it passes along the nerves and blood-vessels behind the mucosa and anæsthetizes this as well as the bone.

I will confine myself, as otologist, to the description of the exact technic of injection for operative procedures on the ear, such as the simple and the radical mastoid operation. The technic of the operation on the frontal and

maxillary sinuses is so simple that after reading this paper any one can readily do it himself.

Indications for anæsthesia in the operation for acute mastoiditis.

Only such cases are suitable for local anæsthesia in which there is no subperiosteal abscess. In those cases in which such an abscess exists, sufficient pressure in the abscess cavity can not be obtained to permit absorption of the fluid into the interior of the mastoid process, and the fluid would again escape through the opening made by the needle.

With the exception of these cases just mentioned, we regard local anæsthesia as contraindicated only in very nervous individuals; on the other hand, we recommend it most earnestly in all cases of weak, non-compensated hearts, in advanced pulmonary tuberculosis, in acute affections of the lungs, diabetes, nephritis, and in short in all cases in which general narcosis is contraindicated.

In all other cases the operation under local anæsthesia is just as good as that under general anæsthesia, and we make it a rule, in cases in which there are no fixed indications for or against local anæsthesia, to allow the patient to decide for himself. We found that usually when there is one patient in the ward, who has been operated upon under local anæsthesia, a number of other patients would then decide to allow themselves to be operated upon in the same manner, while it happened less often that patients preferred the local to the general anæsthesia, without the example and the encouragement of other patients.

Preparation of the patient; technic of the injection and operation.

According to the instructions of Reclus, one must lay special stress upon the fact that the patient takes a hearty meal before the operation. Experience shows that no toxic symptoms will then arise, even if doses as high as 20cg, without the admixture of adrenalin, have been given. After the patient has been shaved and disinfected, he is covered with sterilized cloths, as is usually done in such operations; the physician who gives the injection disinfects himself in the usual manner after he has prepared the solution. We

used at first 0.05–0.06 cocain to which we added 3–4 drops of tonogen¹ per cc, making in all 18–24 drops. We noticed that we had almost an entire absence of blood and the operation gave the appearance as though working upon a cadaver, but while waiting for the injection to take effect toxic symptoms appeared in a number of the patients, which we attributed, according to the investigations of Braun, to tonogen. Some of the patients complained of quite severe headache immediately after the injection, especially in the region of the sagittal suture and in the forehead; the action of the heart became accelerated and often irregular, as well as the beat and tension of the pulse. There was a feeling of constriction over the chest, and nausea, and the patients became pale. The symptoms never became so serious that artificial means had to be resorted to. The patients received an abundance of black coffee so that the toxic symptoms began to subside before the operation was begun and always disappeared entirely by the time the incision was made in the skin. Sometimes these toxic symptoms are not at all pleasant to the physician and patient. We therefore no longer aim to get a complete absence of blood, and are satisfied with the anæsthetic action alone, as we find a diminution in the hemorrhage, even if we use much less tonogen, namely 10–15 drops in all. Our mixture consisted therefore of 0.05–0.06 cocain in solution to which 10–15 drops of tonogen were added. With this mixture we have never observed toxic symptoms. 0.05–0.06 cocain amounts to about 5–6 syringefuls. It has been found advantageous, however, to inject 8–10 Pravaz syringefuls. In a large number of cases we have added to this solution 3–4cc normal salt solution, so that our mixture for injection now consisted of 5cc of a 1 per cent. cocain solution + 12 drops of adrenalin + 3cc of normal salt solution. This mixture must not be boiled, but must be merely warmed to body temperature before injection, according to the suggestion of Braun.

The injections are made in the line of incision, usually

¹ It may be mentioned here that we have used all the suprarenal preparations in the market (adrenalin, suprarenin, tonogen, etc.).

three in number (one at the upper end of the auricle, another at about the centre, and the third at the mastoid tip), and two along the anterior surface of the mastoid process. It is best to inject first at that place at which one wishes first to incise and chisel. We have never found it necessary first to anæsthetize the skin where the injections are made. Even the most sensitive patients readily stood the slight pain produced by the injection.

We use for injection a metal syringe made by Reiner, which can be sterilized and is provided with a strong needle. The point of the needle must be introduced at an angle to the bone, and as soon as one feels the bone, push the needle slightly forward and then inject. That the injection has been successful is shown by the fact that the fluid enters with great difficulty and no swelling arises, with the exception that we get a slight bulging of the soft parts owing to the subcutaneous injection which always accompanies the subperiosteal injection.

The periosteal injection is readily carried out, when the periosteum is only loosely attached to the bone—that is, over the planum mastoideum and backward towards the occipital bone, and on the anterior surface of the mastoid process. The injection is much more difficult when the periosteum is very adherent to the bone, as at the tip of the mastoid process. At this place one must pierce the periosteum by pushing the needle here and there, in order to at least infiltrate the periosteum with the fluid even if the subperiosteal injection is not successful. With a little practice it is possible to obtain a complete anæsthesia also at the tip of the mastoid process.

The injections of the anterior surface of the mastoid process are also of special importance. If these are not carried out, the patient suffers excruciating pain, especially if there is caries of the posterior wall of the meatus. The injection is made in such a manner that we introduce the needle behind the ear at the line of attachment of the auricle, parallel to the posterior wall of the meatus (*i. e.*, the anterior surface of the mastoid process). At the end of 10–15 minutes one can proceed with the operation. The technic does not vary from

that in any other mastoid operation, with the exception that one does not, especially at the beginning, pull too forcibly on the periosteum and does not chisel away too large pieces of bone in order to avoid physical shock. This does not cause the patient any pain, but he feels a pressure on the other ear upon which he is lying, and gets thereby a false impression of the extent of the operation. While hammering one must always put a small pillow under the head of the patient. One of the physicians or a nurse should constantly converse with the patient, in order to get his mind off the operation. This succeeded so well in a number of cases that some of the patients laughed and joked, while others smoked cigarettes and cigars during the operation. After the operation the patients often feel so well that they insist upon walking out of the operating room, which we allow on account of the impression which it makes upon the other patients. We have never experienced any post-operative hemorrhage or necrosis as a result of the tonogen. Ligatures are only seldom used. They are replaced by a compression bandage. We have never observed any unpleasant sequelæ after the operation.

Radical Operation.—In order to carry out the radical operation without pain, it is necessary to combine the injection method employed in opening up the mastoid process as given above with the method of injection which I have devised for the extraction of the hammer and incus. In the radical operation we need 12–14cc of the mixture. We combine 7–8cc of a 1 per cent. cocain solution, 15 drops of adrenalin, and 5–6cc of a normal salt solution. According to the experience of Reclus, who injects 15–19cg of cocain before introducing the adrenalin, and Schlemmer (*Vierteljahr. f. Zahnheilk.*, xxi., Jan. 1905), who injects 0.48 cocain in the course of three hours, one may be able to use even larger doses of cocain without getting any toxic symptoms. We got along very well, however, with the doses as given above. The order of injection must be carried out in such a way that the injection is made last at that place at which we operate the latest—that is, the injection in the external meatus is made only after the injections in the mastoid pro-

cess have been completed. The injections in the mastoid are performed in the same manner as in the operations in the acute cases. One must again lay special attention to the tip and anterior surface of the mastoid process. Great care must be taken not to perforate the posterior wall of the external meatus and not to inject into the meatus instead of into the anterior surface of the mastoid.

Having finished this injection, we next inject four syringefuls of the mixture—that is, one syringeful in each of the four walls of the meatus, at the place of union of the cartilaginous and bony parts. This local anæsthesia is not applicable to those cases in which the posterior superior wall of the meatus has been considerably raised up from the underlying tissues, owing to suppuration and the formation of cholesteatoma. In such cases the pressure which aids absorption is again wanting. The fluid escapes immediately after the injection and does not produce the desired anæsthesia. Total destruction of the tympanic membrane is, on the other hand, no contraindication.

Having made the injection one needs to wait only ten minutes, or if the injection into the external meatus has taken a longer time, we may begin even immediately with the opening up of the mastoid process, as the injection into the meatus will have produced the desired anæsthesia by the time we reach the antrum and tympanic cavity.

Dr. Alexander and myself have up to the present performed twenty radical operations under local anæsthesia, and are very much satisfied with this method. In a few of the cases there was, to be sure, a slight pain now and then, due to our technic, which was not as yet fully developed, but in the course of time we learned how to overcome such small errors, so that we are now able to carry out the entire radical operation without the least pain. The incision in the skin and in the periosteum, as well as removal of same, and the separation of the membranous meatus, are absolutely painless. The curetting out of the tympanic cavity and antrum, the extraction of the ossicles, and the plastic operation, are also all carried out without pain. Up to the present time there is one part which we have not as yet been able to

anæsthetize, in spite of the fact that we have placed a cotton plug soaked in a 20 per cent. solution of cocain in the tympanic cavity in addition to injection, and that is the Eustachian tube. It seems that it is not possible to obtain a sufficient analgesia at this point with the method given above. The curetting of the tube, is, however, a procedure of such short duration, which one can very well do at the end of the entire operation, that one need not for this reason hesitate to carry out the operation under local anæsthesia. The duration of the operation and anæsthesia lasted, in some cases, an hour and a quarter. None of the operations took a longer time. Working on the bloodless bone hastens the operation, which is, on the other hand, retarded in proportion through consideration for our patients. We have, as a rule, ligated only the inferior auricular artery. Post-operative hemorrhages as well as other unpleasant sequelæ we have never observed. Also during the performance of these operations, the patients were allowed to smoke; they conversed, joked, and laughed, and only seldom complained of the unpleasant concussion caused by the chiselling, which, however, was not really pain. It is only when removing the cortical layer that pain in the teeth is sometimes experienced, which, however, is overcome or lessened by firmly closing the jaws, and is then, as a rule, felt only to a slight degree.

The detailed history of twenty cases, ten acute cases, in which merely the mastoid was opened up, and ten in which the radical operation was performed, follows (see German original).

ON DISTURBANCES OF SPEECH IN CHILDHOOD.

BY DR. VICTOR HAMMERSCHLAG, VIENNA.

Translation from *Zeitschr. f. Ohrenhkk.*, Vol. XLV., 1903, German Edition
of these ARCHIVES.

THE following is a report of a case of disturbance of speech in a child which presented a number of points of interest.

E. W., born on December 22, 1898, was brought to me by her mother with the statement that the child does not talk, although the hearing is apparently normal. The family history is as follows:

The little girl, now five and a half years old, comes of entirely healthy parents, of whom both are alive. The grandparents on both sides were also healthy, and attained a rather advanced age. There have been no consanguineous marriages. The mother has given birth to four children, all of whom are now entirely healthy.

The personal history of the child is as follows: The birth was normal; the child developed normally in the first year. At the age of fourteen months it could walk and articulate several words like "Mamma," "Tata," "Papa," and seemed to have a perfectly normal hearing. It then was taken ill with convulsions. The first convulsive seizure set in while the child was in perfect health, and lasted for three hours. The seizures were repeated for several days. During this time there was a rise of temperature. A measles eruption appeared, which followed a mild course. After eight or ten days the convulsive seizures ceased. The entire illness, up to the onset of convalescence, was sixteen weeks. The mother states that after the first seizure the arms and legs of the child were as if paralyzed. The child lay quietly

in bed, and was unable to move the limbs. Furthermore, the rudiments of speech were lost after the first attack. The hearing, however, was as good as before, as the child re-acted upon being called by not only moving its entire head, but also by rotating the eyes. During convalescence the child could not walk, and had to be again carried. After one year a number of syllables again could be pronounced, such as "Papa," Mamma." In the third year it slowly relearned to walk and to run. As regards speech, no further progress was made. The child had only acquired a few additional words. Otherwise the child is entirely healthy, understands every word which is addressed to her, goes on errands, executes commissions, plays with her sisters and brothers. On examination, a well-nourished child. The skull is slightly rachitic, and the cranial nerves are unaffected.

Examination of the extremities shows no abnormality. The motor power is normal. There are no contractures. Reflexes not increased.

Examination of the internal organs also negative. Examination of the ear showed that the vowels *a*, *i*, and *u* could be heard when spoken in low conversational voice at a distance of at least 10 mm. All of the Hartmann tuning-fork series (*c-c*⁶) were perceived on both sides up to the point of dying out.

Repeated examinations of the intelligence showed that the child followed all orders, though with some hesitation. It closes the door, carries a book, sits on the floor, raises the right and the left arm, closes the eyes, shows the tongue, recognizes a number of objects. It studies pictures with pleasure and with comprehension; distinguishes between the ordinary domestic animals. It, however, does not distinguish colors nor understand figures. This shows that the intelligence of the child is surely quite good, though this test does not suffice to determine whether the child is psychically and intellectually entirely normal. Rather unusual is a certain lack of attention and an unusual confidence to strangers.

There seems to be no question that this is a case of motor aphasia, though it is difficult to decide whether this condition is congenital or one acquired in early childhood. If it is a congenital condition it must be classed in the clinical picture described by Coën as hearing-mutism or alalia idiopathica. Coën (*Pathologie und Therapie der Sprach-anomalien*,

Wien u. Leipzig, 1886) describes the clinical picture as follows: "A child, usually of good healthy external appearance, with well developed bodily constitution and normal mental development, is conducted to the physician with the statement that notwithstanding its advanced age (4-10 years) it has never learned to talk. The child appears well, understanding everything, follows all orders, enjoys excellent health, but cannot enunciate any articulate speech." These statements of Coën's must be supplemented by the observation that some of these children can spontaneously possess a small amount of speech, usually "Mamma," "Papa," "Tata." Coën continues: "On the closest examination of these patients, there is no external condition which can be brought into connection with the defect. The intelligence and the hearing in these individuals are well developed and apparently in good functional order." Though Coën considers hearing-mutism as usually a congenital inability to produce articulate sounds, it seems probable that he is inclined to regard this trouble as a congenital affection. In another place he says: "As a cause for this defect a traumatic or psychic effect on the youthful organism is accepted. In all of these cases it can with certainty be determined that shortly before an acute pathologic process has taken place which can be followed by the loss of speech. I have found in a large number of these cases that the hearing-mute children come of families in which a similar or a closely allied defect in speech was present, which was due to a retarded or rudimentary development of certain organs. These arrested developments occur in children whose parents have presented the same anomaly in their youth or show some defect with lack of resistance or weakness. Moreover, consanguineous marriages, just as in deafmutism, seem to augment the anomaly of development which causes the hearing-mutism."

Subsequently the clinical description of the disease—hearing-deafness—has been adopted by Alt and Treitel.

These authors have endeavored to show that hearing-mutism as well as the psychic deafness of Heller are only symptoms of idiotic mutism.

Leaving this question undecided, we must insist that we

regard hearing-mutism as a congenital lesion depending upon a cerebral disturbance and not identical with the acquired aphasias of childhood.

In this regard the following points in our case are of interest. Against the theory of congenital disease, we found an absence of every hereditary taint as well as the presence of a number of completely normal older brothers and sisters. It should again be repeated that there was no consanguineous marriage in the family.. Positive proof for a congenital anomaly of development is not present, while the statements of an unusually attentive and intelligent mother speak for the possibility of an acquired aphasia. It can be taken for granted that the power of walking was completely lost after the convulsive seizures. The question remains whether aphasias can occur in the course of acute febrile infectious diseases in childhood. This possibility is suggested by a number of observations. Aphasias, as well as paralysis and paresis of the extremities, belong to the not unusual complications of typhoid fever, scarlet fever, whooping-cough, diphtheria, pneumonia, and finally measles.

Bohn reported on 6 cases of aphasia which he had observed himself after typhoid fever in children. In one case the aphasia was associated with a right-sided hemiparesis. In all of these cases the aphasia disappeared after a relatively short time, usually in the course of one week. To explain this condition the author assumes a structural or circulatory disturbance in the speech area of the cerebrum. The post-typhoid aphasias give apparently the most favorable prognosis. They are usually isolated. The aphasias occurring after scarlet fever do not generally give a bad prognosis even in those cases where they are combined with a hemiplegia and where an organic lesion of the brain seemed to be present. On the other hand, the aphasia after scarlet fever seems to remain for a long time. Finlayson observed a hemiparesis and marked disturbance of speech in a boy after a year and a half. In the well-known case of Eulenburg-Bernhardt-Sander, of a boy eight years of age, which showed a very unfavorable course, after two months hemiparesis and almost complete aphasia still existed. The hemiparesis was

present five years later, while the aphasia had disappeared. The mental functions of the boy had suffered severely. The autopsy, which occurred eleven years later, revealed an atrophy of the left cerebral hemisphere. I have found four cases described in literature of aphasia occurring after measles:

1. Case of Schepers. ("A Case of Nervous Affection in Measles," *Berl. klin. Wochenschrift*, 1872, p. 517.)

A girl eight years of age was taken ill with measles. Four days later her condition grew very much worse and the child became comatose. On waking from her coma three days later, she was completely aphasic. The sensorium is free; the understanding for speech is preserved. The hearing is normal; the legs are paralyzed. There is ataxia of the upper extremities. The author believes that an acute hydrocephalus was present. In the subsequent course a relatively rapid and complete recovery took place. After ten days the child was able to enunciate the vowels, some consonants, and several words, and it could stand upright for several minutes. Gradually the speech and the power to walk returned.

This case is somewhat similar to ours because motor disturbances of all the extremities were present. The disturbance of speech, however, in this case was of a more transient nature.

2. Case of Schwarz. ("A case of aphasia with simultaneous paralysis of the extensors of the right upper extremity after measles," *Deutsches Arch. für klin. Medicin*, xx., Bd., 1877, p. 615.)

A child three years of age, feeble though never previously ill, and of good intelligence, suffered from measles and high fever. On the onset of convalescence 18 days after the beginning of the disease the child became aphasic and motor disturbances in the right upper extremity became apparent. Subsequently complete gradual recovery took place. The aphasia disappeared exactly in the way in which the child had originally learned to talk.

3. Case of Calmeil. ("Inflammatory Disease of the Brain." Quoted by Moeller, *Archiv f. Kinderhkd.*, 1897, vol. xxi., p. 297.)

A healthy boy after measles suffered from severe convulsions with continuous coma, from which he woke deaf, blind, and dumb. Fourteen days later the hearing returned. One year later he was able to speak a few words. He, however, remained blind and became epileptic and hemiplegic on the right side. Up to the 13th year idiotic. He died when twenty-two years old. On autopsy probable sclerosis and atrophy of the entire left hemisphere as the result of the encephalitic processes which were caused by the measles infection.

4. Case of Möller. ("On the Statistics of the Epidemic of Measles," *Arch. f. Kinderhklde.*, vol. xxi., 1897, p. 297.)

A case of amnesic aphasia in a girl five years of age who had passed through an uncomplicated but exceedingly febrile attack of measles. After this illness the child had lost all power of speech except for a few words. She understood all questions; answered by gestures. In the course of the next weeks she gradually relearned to speak and after a few months the speech was entirely normal.

These cases show that disturbances of speech occurring after acute infectious diseases, especially measles, are usually of a transitory nature. Our case, which is apparently an exception, resembles principally the case of Calmeil previously quoted, and the case of Eulenburg.

The prognosis depends upon the form and intensity of the anatomic changes in the brain associated with the original disease. The anatomical material does not suffice to gauge the disturbances of hearing occurring after infections. For these transitory forms of aphasia some authors assume a rapidly transient œdema of the brain. Bohn speaks of disturbances of the circulation. Heinemann does not think that in these transitory aphasias gross lesions of the central organs can possibly be present. In the cases, however, in which the hemiplegia is combined with the aphasia an organic disturbance in the brain substance must be assumed to be present. Calmeil believes that in his case of unhealed aphasia an encephalitic process was present with sclerosis and atrophy of the left cerebral hemisphere. It seems most probable that in our case a number of encephalitic foci were present.

ON OBJECTIVE TINNITUS.

By DR. C. FRIEDMANN.

Translated from *Zeitschr. f. Ohrenhkl.*, Vol. XLVI., 1904, German Edition of these ARCHIVES.

CASES of objective tinnitus are rarely found in literature; hence the report of the following case seems justified.

The patient, a girl nine years of age, has complained of peculiar noises in both ears for several weeks, which are also appreciated by the mother of the child. There are no subjective symptoms. Two years ago the girl had suffered from appendicitis, and had been ill for twenty-nine weeks. This was followed by a paralysis of the lower extremities, apparently due to a spinal meningitis with gradual complete recovery.

The patient at present suffers from general nervous symptoms, with occasional convulsive movements of the lower eyelids and of the muscles of the chin. The right pupil is somewhat larger than the left. The left eye shows a slight paresis of the left internal rectus muscle. The cardiac sounds are normal, pulse 117.

At a short distance from either ear of the child, and more distinctly on placing the ear on that of the child, a rhythmic uniform noise is heard of a crepitant character, which occurs from time to time and disappears without known reason. The frequency of the noise is 100-120 per minute. It is not synchronous with the pulse. There are no movements to be observed in the drum. Occasionally contraction of the soft palate synchronous with the noise can be observed. The convulsions in the muscles of the lower jaw appear also to be synchronous with the noise. Hearing is normal.

The child is apparently very nervous and is extremely fearful. Hence a thorough examination cannot be performed, a post-

rhinoscopic examination could not be undertaken and treatment could not be followed.

The diagnosis was made of a chronic spasm of the tensor veli muscle on both sides. During the three weeks in which we observed the patient no change occurred. As the noise was not simultaneous with the pulse it can be accepted that it was not a vascular bruit. It therefore must be a muscular noise. The muscular noises have been divided by authors into two groups, those originating in the intrinsic muscles of the tympanum, the so-called entotic murmurs, and those depending upon the tubal muscles, the so-called tubal noises.

It was formerly believed that all these noises depended upon a contraction of the tensor tympani muscle, until Politzer in 1862 showed that this peculiar crepitation could be produced by a separation of the anterior from the posterior wall of the tube. He also observed a synchronous associated movement of the soft palate. It has since then been discovered that the noises are caused by the tensor muscle of the soft palate. Cases have been examined post-rhinoscopically where this separation of the tubal lips was observed synchronously with the noise. Cases in which the spasmodic contraction of the tensor tympani has produced this crepitation and associated movements of the drum or at least a variation in the air pressure in the external auditory canal have been observed.

Kaiser believes this noise to be a muscular tone depending upon the contraction of the tensor tympani muscle, similarly as the cardiac tone is due to the contracture of the heart muscle. Brieger, however, believes that the muscle is altogether too delicate to produce so intense a noise. Others have thought the noise was the result of the friction of the ossicles or the vibration of the drum membrane. As the character of the noise is always the same, Brieger believes that it is always produced by the same cause, namely, the opening of the tube, though he is not certain whether this is produced directly by the tensor tympani or by means of a synergic action of the tensor veli, which has the same nerve supply. Troeltsch has shown that contraction of the tensor veli can cause this noise.

From other observations and from the cases which have been cited, it seems that this is not an isolated action of the tensor tympani, but that there are other muscles in this neighborhood which are active. Cases have also been reported in which the noises have been referred with certainty to a simultaneous irritation of the tensor tympani and of the tensor veli. Brieger has reported one of these cases, in which a manometric variation of temperature was observed in the external auditory canal simultaneous with the noise, and a fluid reflex could be observed in the tubal opening of the pharynx. After division of the tendon of the tensor tympani the noise was arrested for a short time, but then was louder than ever and distinct spasms of the soft palate could be observed. The variations in pressure in the external canal had ceased. After sixteen days the movement of the soft palate became less marked, the noise became louder, the variations of pressure again were present. The tendon evidently had reunited, and both muscles were responsible for producing the noise. It seems, therefore, that an affection of the tensor veli muscle must be assumed, and that the tensor tympani is not involved in those cases where the drum shows no movement.

In the cases of this kind which have been reported, a peculiar disappearance and reappearance of the symptoms was noticeable. In some these symptoms could be voluntarily influenced by the patient, though in no case was it possible to permanently arrest the noise. Moreover, it seems possible for healthy persons to produce a similar noise.

As regards the cause, in most of the cases the patients have been nervous after a general illness or one of the ear. As every one agrees that the disease depends upon nervousness and hysteria, the treatment must be an appropriate one.

REPORT OF FOUR FATAL CASES AFTER PURULENT OTITIS.

By DR. HOELSCHER, ULM.

Translated from the *Zeitschr. f. Ohrenhkk.*, Vol. XLV., 1903, German
Edition of these ARCHIVES.

THE following four cases of purulent otitis which terminated fatally are of interest both from a clinical standpoint and from the autopsy findings.

CASE I.—K.M., twenty-four years of age, consulted me on March 7, 1903, on account of pain in the left ear. Three weeks later he returned stating that the ear had discharged for 8 days. Paracentesis was performed. There was headache in the right half of the head, the auditory canal was filled with pus and there was a small perforation down and back. There were no mastoid symptoms. Whisper was heard in 4*m*.

Another paracentesis was made. This was followed by a more profuse discharge. Headache continued. The pain was most marked at the supraorbital foramen. The mastoid process was free from symptoms.

On the following day, after a very bad night, the bone directly above the auricle was tender. There were typical severe attacks of supraorbital neuralgia. The point of greatest tenderness was directly at the supraorbital foramen. Operation was advised, but, as the general condition improved somewhat, the patient preferred to wait until one week later, when he had passed another very poor night.

Operation revealed the mastoid cortex hard and sclerosed. On removing the bone in the region of the upper auditory canal wall, a large quantity of yellowish pus suddenly escaped. The probe entered into a large cavity in the middle cranial fossa. A large part of the squama was then removed. The bone was

found partly softened. The dura of the middle cranial fossa was covered with thick granulations which were removed with a curette. There were no fistulæ to be seen in the dura, and, viewing from above, there was no fistula entering the tympanum. The mastoid process was found normal. The pus contained pneumococci.

During the next few days the patient was free from pain and fever, until, one week after the operation, he experienced very severe pain in the distribution of the left trigeminal nerve during the night. Pulse 84, regular. Sensorium somewhat affected. Pain over the supraorbital and infraorbital foramina, and the entire temporal region was tender. On changing the dressing the wound looked well.

On the following day the sensorium was again normal. The patient stated that he was crazy yesterday but felt much better to-day. He called all objects "nerves." He was able to correctly describe objects and denote their use, and took nourishment well. Examination of the eye-grounds negative. No headache.

On the following day the brain was punctured without striking any pus. The patient's condition did not improve. His temperature remained at about 38.3° , pulse 74. Almost constant stupor and headache alternating with delirium. He gradually grew weaker. Difficulty of speech. He became so noisy that he had to be isolated, and on April 28th died.

Autopsy.—During the removal of the brain a large quantity of thin, fluid pus escaped from the incision in the dura. On removing the dura, the brain is softened, and in the posterior cranial fossa and in the vertebral canal there is a large quantity of thin pus. The anterior and lower half of the cerebellum, the pons, and the corpora quadrigemina are softened and covered with a greenish membrane. On the posterior surface of the petrous bone to the inner side of the sigmoid sinus there is a necrotic area 1cm in diameter in the dura. The sinus is normal. In the left middle cranial fossa the dura is separated from the petrous bone and the bone is rough. There is no pus between the bone and the dura. The dura is only moderately thickened.

In the roof of the 4th ventricle there is a purulent exudate. The 3d and 4th ventricles contain a purulent fluid. An abscess cavity measuring 9cm by $4\frac{1}{2}$ cm is situated at the medial side of the left temporal and occipital lobes. A puncture canal

is still recognizable and extends directly to the abscess membrane. On the roof of the tympanum there is a very small fistula. The surrounding bone is carious.

Remarks.—This otitis, apparently beginning as a usual one, must have quickly led to disease of the tympanic roof and then to the formation of an extradural abscess, which in turn produced the abscess in the temporal lobe. The very profuse suppuration was due to the extradural abscess, the pus escaping through the fistula in the tympanic roof. The absence of mastoid empyema is interesting. The neuralgia of the 5th nerve was apparently the result of the brain abscess.

The continuous one-sided headache, the tenderness on pressure, and the exceptionally profuse suppuration suggested the presence of an extradural abscess in the middle cranial fossa. This condition was also found at operation, and the amount of pus was so large that it seemed sufficient to account for all the symptoms, and during the next six days the patient was practically free from symptoms. Then the neuralgia returned and the sensorium became disturbed. Puncture of the brain was negative. His condition then rapidly grew worse. The extremities became cold; there was difficulty of speech. On the following days the patient became so delirious that he resembled very much more a maniac than a sick person. The path of infection in the production of a temporal lobe abscess was not found at autopsy as no fistula was revealed in the dura and the dura on its inner surface appeared normal. The extension to the posterior cranial fossa was, however, very distinct. The extradural abscess had extended posteriorly to the petrous pyramid, then downwards between the sigmoid sinus and the internal auditory meatus, where the dura became necrotic and an entrance was made under the posterior cranial fossa.

CASE 2.—S., twenty-two years of age.

The patient was taken ill with nose-bleed and chill. To this were added headache and pain in the chest. After three or four days these symptoms all disappeared except the headache. On

the following day there was a slight inflammation of the throat. Two days later the pain was more severe, especially in the occiput, and the right ear began to discharge. On that night the nose-bleed was repeated and there was a severe chill. The right auditory canal contained foetid pus. Temperature, 39.4° . The patient states that he had frequently previously suffered from earache and discharge from the ear, with swelling behind the ear. On admission there was thick pus in the right auditory canal. The drum revealed a large perforation occupying almost the entire posterior half. No œdema over the mastoid process. Some pain above and behind the insertion of the auricle. On percussion the right half of the head is very painful, especially over the transverse sinus. No rigidity of the neck. Some tenderness along the jugular vein. Nystagmus on looking to the left. Severe vertigo on standing. Pulse 110, full and strong. Weber to the affected side. Hearing almost lost. The operation revealed pus and granulations in the antrum, attic, and tympanum. A cavity extended directly backwards from the attic which contained a sequestrum as large as a pea embedded in granulations. After cleaning out this cavity no fistula was to be found. The surrounding bone appeared healthy. The hammer was fairly normal. The incus could not be found.

For the next few days the general condition was much better, although there was some serous discharge from the left ear. A little over two weeks later the patient began to complain of very severe headache. The appearance of the wound was normal. Pupils reacted promptly. No tenderness on percussing the skull. The urine contained some albumen. The headache continued on the following days, and was most marked over the forehead. There were no other symptoms. During the night there were occasional convulsive seizures of the entire body. The headache continued and was so severe that the patient could not sleep. The convulsions more frequent. The patient became stuporous, with distended abdomen. Pulse full. The right pupil was more dilated than the left. On the night of March 29th, after numerous convulsive attacks and disturbances of respiration, the patient died.

Autopsy.—The dura was normal. On removing the brain two teaspoonfuls of yellowish pus were removed from the base of the brain, and a large quantity escaped from the vertebral canal. The brain at the base, and especially along the blood-vessels and

at the site of the nerves, is covered with tough purulent exudates. These membranes extend to the posterior surface of the cerebellum and into the Sylvian fossa. The occipital and temporal lobes are adherent. All the ventricles are distended with a clouded serous fluid. The choroid plexus on both sides is clouded and thickened. The markings of the cerebellum on section are indistinct. The white mass of the brain presents numerous small hemorrhages on section. There is no abscess. The dura is firmly united to the bone at the base of the skull and there are no fistulæ or purulent infiltrations. The sinuses are all normal. The diagnosis was cerebro-spinal purulent leptomeningitis with internal hydrocephalus.

Remarks.—The patient was taken ill without known cause. The disease was recognized as grip, though the symptoms of this affection disappeared, except that the headache and fever returned with pain in the occiput and discharge from the right ear. The presence of tenderness over the transverse sinus and the jugular bulb suggested a sinus trouble but at operation there was no reason to suspect this, as there was no fistula or carious area of bone leading to the sinus. Operation was followed by a number of days of comparative improvement. The headache then returned with an evening rise of temperature. This was followed by the onset of chronic convulsions which involved the entire body, at first mild and at long intervals, later with greater frequency. The patient became unconscious. The clinical course of the autopsy makes it evident that the beginning trouble was not this attack of grip, but the onset of the meningitis. A lumbar puncture at that time might have given us some definite information. The case then was an uncomplicated one of otitic meningitis with protracted course. It is curious that there never was any rigidity of neck, nor any other symptoms beyond the headache, fever, and constipation. It was not possible at autopsy to find the path of infection. It probably started from the region of the sequestrum.

CASE 3.—B., twenty-one years of age.

On March 6, 1903, the patient had taken cold. He complained of pain in the chest, and had some fever. The condition improved, but on March 28th he returned on account of deafness.

Four days later there was some rise of temperature, and the throat was inflamed. The patient had previously never suffered from his ears. The ears began to discharge on the night of the 3d of April. The right auditory canal contained a serous hemorrhagic fluid. The canal was very tortuous. The drum was reddened; perforation was not visible. In the left ear there was a recent perforation down and in front. Hearing diminished in both.

April 6th.—Tonsillitis is very much diminished. There is headache and tenderness over the left mastoid process. The suppuration is profuse. On admission the left auditory canal contained a great quantity of pus. The drum was grayish, with desquamated epithelium. There was a perforation down and back. The mastoid incisure was tender. There was no œdema on the right side. There was a perforation down and back. The mastoid process was normal. The patient complained of pain in the left half of the head and vertigo. During the last five nights he had not been able to sleep. On the following day the condition had not practically changed, except that the hearing had diminished very much. The vertigo had increased, and there was some nystagmus on looking to the left. The tenderness over the mastoid on the left side had increased.

During the following night the patient was somewhat stuporous, with occasional delirium. There were slight convulsive seizures. The pulse was weak, 120–130. There were no inflammatory signs over the mastoid process, though the bone was tender on pressure. Operation was decided upon.

On removing the cortex, with the first blow of the chisel a dirty, grayish membrane was presented, which proved to be the anterior wall of the sinus. The bone intervening between the auditory canal and the sinus was not more than 2mm thick. This thin plate of bone is a dark dirty brown. The mastoid tip is prominent, and contains a number of large cells filled with pus. The tip and most of the posterior wall were then removed. The sigmoid sinus was exposed from the upper knee downwards. The entire sinus wall was a dirty gray, and the sinus does not pulsate. Puncture with a sharp knife at the upper knee was followed by the appearance of a weak stream of dark blood, which ceased immediately. The cutaneous incision was prolonged downwards along the anterior margin of the sterno-mastoid muscle. A green cylindrical body as large as a small finger was exposed, doubly

ligated, and divided. The pulse had grown so much weaker during the operation that stimulation was necessary. In the course of the day the stupor seemed to be less. Towards evening the patient became restless and delirious. In the night the pulse became weak. Death ensued.

Autopsy.—The dura appears normal. The longitudinal sinus contained fluid blood. On incising the dura yellowish pus appeared at the posterior part of the left temporal lobe. The upper side is infiltrated with pus.

The convolutions in the convexity of the brain are flattened. The brain mass itself on section reveals no abnormality. The base of the brain does not show any purulent exudate. The cerebellum is soft and friable. The ventricles contain some clouded fluid. The transverse sinus on both sides contains fluid blood. The left sigmoid sinus shows in the region of its upper knee a tenacious purulent clot attached to the outer surface, which consists of fibrin threads and pus cells. The jugular bulb and the other sinuses appear as fluid blood. There is no pus in the right mastoid process.

The pericardium contained some clouded blood.

The diagnosis is thrombo-phlebitis of the left sigmoid sinus after purulent otitis. Beginning meningitis over the left temporal lobe.

The cause of death: Heart failure from septic pyæmia.

Remarks.—The first symptom on the part of the ear was deafness. Subsequently there was fever with tonsillitis. The otitis, therefore, preceded the tonsillitis. The mastoid process was free. The mastoid incisura was tender. Tenderness over the mastoid incisura, with high fever and purulent otitis, signifies a sinus affection. The symptoms, however, were not so distinct as to make the diagnosis certain. On the following day the symptoms of a sinus affection were more pronounced. The patient became delirious, and there were slight chronic convulsions. With poor heart action, the outlook for operation was not favorable. It was nevertheless undertaken. At operation the sinus was found unequally displaced forward and diseased for a long stretch. Puncture showed an obturating thrombus. The jugular vein was therefore to be ligated before the sinus was opened. The vein could not be found, and the operation was not

completed, because the patient's condition became too weak.

The disease of the sinus in this case was the result of the direct contact of the sinus wall with the diseased bone. The small circumscribed meningitis joined the diseased transverse sinus. Perforation of the walls had not taken place. It is interesting to note that there had never been any chills.

CASE 4.—K., twenty-one years of age.

The patient was taken ill with severe pain in the limbs and in the head, especially in the throat and in the left ear, with a purulent discharge from the latter. He was unable to stand, was stuporous and delirious. Pulse 99. Temperature 40.4° .

General physical examination revealed no abnormality. The pharyngeal mucous membrane was very red, and in the left ear the drum was red, and the tympanum contained pus which discharged drops of pus through a very small opening.

These symptoms of the type of an influenza gradually were transformed to those of a septicæmia, possibly originating from a middle-ear suppuration. There was irregular temperature (37.6° to 40.5°). The pulse rate was rapid (90 to 120), the pulse was weak and soft. There apparently was no meningitis. The dorsum of both feet, especially the right one, were very much swollen and reddened. On the external surface of the right foot there was a large bleb containing bloody fluid. All the joints were tender. The stupor and delirium were associated with attacks of extreme weakness.

The patient died, and the following conditions were found at autopsy:

The dura normal. The pia transparent, somewhat clouded over the convexity. The brain is normal. The dura at the base of the brain in an area corresponding to the left transverse sinus is lack-lustre and greenish-yellow. The sinus contains a thrombus extending into the jugular foramen. On the side towards the petrous bone there is a collection of thick yellowish pus where the dura is necrotic and roughened bone exposed. The tympanum and the mastoid process contain yellowish pus. The left drum is defective.

Remarks.—The severe and rapid course of this case re-

sembles the preceding. An operation performed at the proper time would probably have saved the patient's life, because the disease of the sinus is usually caries of the posterior wall of the petrous bone, with necrosis of the dura and of the anterior wall of the sinus. Neither a paracentesis nor a mastoid operation was performed. The symptomatic treatment in these cases is equivalent to no treatment at all. The course was absolutely typical.

REPORT OF THE TRANSACTIONS OF THE SECTION ON OTOTOLOGY OF THE NEW YORK ACADEMY OF MEDICINE.

REGULAR MEETING, APRIL 12, 1906, DR. GRUENING IN THE CHAIR.

Presentation of patients.

Dr. HARRIS said that he presented this patient in order to afford the members an opportunity to examine her, and asked that they would give their opinions concerning the conditions present and the methods of treatment to be pursued. The girl, seventeen years of age, was attacked about five weeks ago with an involvement of all the accessory sinuses of the nose on both sides, and suffered excruciating pain in the frontal sinus. Turbinectomy was performed on the left side to assist drainage, and the maxillary antrum was opened also. Three days later, as the result of carelessness and undue exposure on the part of the patient, she was seized with pain in the right ear, accompanied by discharge. This was soon complicated by mastoid pain over the antrum and tip. The discharge continued, but in order to secure better drainage a paracentesis was performed. At the height of the attack some sinking of the posterior-superior wall was observed. There was some leucocytosis, and a polymorphonuclear percentage of 64. The infection was streptococcic. The discharge gradually lessened and ceased two or three days ago. The pain over the mastoid antrum and tip disappeared about that time, but up to the present there has been distinct mastoid pain over the posterior portion of the mastoid process, though only on two or three occasions has there been any complaint, but always pain upon deep pressure. Another interesting point in the history, which had only been elicited to-day, is that four years ago the patient had suppuration from both ears and suffered occasional pain in this region without suppuration. There is no tempera-

ture, pulse under 100, the patient eats and sleeps well and has a good color.

Dr. MYLES said that the case presents some rather peculiar features, especially in regard to the lymphatic gland, which was as large as any that he had ever seen in that place. There was evidently a sepsis in that region which was being held in the gland. This was not a common occurrence, though we frequently see small glands there from chronic disease of the meatus, but it seldom happens in these acute processes.

Dr. BRYANT presented a case of **modified radical operation** in a case of recurrent otitis media purulenta with good hearing in the intervals. During the last attack, mastoiditis had developed. The operation revealed a condition which demanded complete exenteration of the mastoid with all its connecting cells, especially those lying in the zygoma and epitympanum. The technique of the operation was planned to give the maximum of drainage without destroying the ossicular articulations, with the intention of retaining a maximum of hearing.

The noteworthy points in the operation were that the posterior meatal wall was removed to the annulus tympanicus which was left intact; the posterior fan-shaped ligaments of the incus and the posterior articulation of the ossicles were not injured; the zygomatic cells and epitympanic space were thoroughly opened by the removal of the posterior and middle root of the zygoma and the hanging meatal wall. At the same time the upper part of the annulus was carefully preserved intact and the attachment of the superior ligament of the malleus was not touched nor the external ligament interfered with. The special points in the result of the operation were the extremely rapid convalescence and the restoration of hearing to what is the normal for the other ear.

The patient, a young man seventeen years old, was operated on last August at the New York Eye and Ear Infirmary. By pain, swelling, and tenderness, the present attack gave signs of mastoiditis lasting six weeks. When first seen the temperature was 100.4° F. There was extensive swelling above and behind the auricle, tenderness over the mastoid region, and purulent discharge from the meatus.

The operation was commenced by an extensive "U" cut in the membrane. The mastoid process and cells were removed. During the course of the operation the dura mater was exposed over the knee of the sinus and the tegmen tympani. The smear

from the mastoid pus showed a mixed infection. The aural pus showed diplococci. The wound was closed without packing.

On the first day, the temperature was normal. On the second day, the packing was taken from the canal. On the third day, the patient was up and dressed. There was no discharge from the ear. Nearly all of the post-aural wound healed by first intention. On the fifth day, the fundus of the canal was nearly dry. On the eighth day, the patient went home. On the tenth day, the membrana tympani was healed and closed, the fundus of the meatus was dry, and the post-aural wound healed, except at one point. On the eleventh day, all the wound was scabbed over and healed. On the fifteenth day, the post-aural was epidermatized. On the sixteenth day, the watch was heard at thirteen inches. One hundred and thirty-five days after the operation, the watch was heard forty-six inches by the operated ear, and fifty inches by the normal ear. There has been no pain nor discomfort of any kind in or about the ear since the operation. The meatus looks normal and the membrana tympani nearly so. The post-aural surface is smooth with a linear cicatrix. The mastoid process has been renewed and is nearly the counterpart of its fellow.

Dr. HELD said that the case appeared to be one of resolving mastoiditis, with disease still existing in the posterior cells. The general contour of the mastoid would seem to indicate this. He had seen similar cases. As a rule, the disease in the antrum resolves first. Should the mastoid bone be opened, which is not indicated in this case, a semi-solid serum would probably be found, and the result of the recent infection is probably affecting the cervical gland which is so much enlarged. He thought that with conservative treatment the case would right itself.

Dr. GRUENING said that he was much interested in the case and had seen a similar one during the afternoon, a woman who had suffered from an otitis media. She has had no symptoms of otitis for the last two weeks, but her hearing was now normal. She came in with a temperature of 105° , chill, and a swelling of the right knee. She was thoroughly examined by the internes and they could find nothing but the enlarged knee. As the ear had been the only organ affected, it was supposed that there must be a sinus thrombosis, although the ear at present showed no symptoms of disease, no tenderness anywhere. Twice in the last year the medical men at the hospital made a diagnosis of this kind by exclusion. There was no discharge, but the patients

came in with a history of chills and vomiting, and other symptoms pointing to sinus thrombosis, but absolutely nothing else beyond the fact that, two or three or perhaps four weeks before, there had been some ear disease. In both of these cases Dr. Gruening had been called upon to open the sinus, and in both found the thrombosis as diagnosed by the medical men. He thought that this case should be watched with a great deal of attention, and that the temperature should be taken two or three times a day.

Report of a case with hysterical symptoms upon which the radical mastoid operation was performed, with blood clot. By W. S. BRYANT, M.D.

The patient, a woman, forty years of age, had suffered from purulent otitis on the left side all her life. She had excruciating headaches, and, periodically, temperature and some dizziness. On April 21st a radical operation was performed, and the bone opened with the Bryant gouge. The knee of the sigmoid sinus was found far forward, the bone between it and the meatus measuring not more than 2mm in thickness. The dura mater was pushed back and the posterior wall of the meatus removed, in order to get at the antrum, which was found to be filled with cancellated and hard bone, leaving only the aditus open. All the bone encountered was sclerosed, and there were no diploë or cells. The mastoid tegmen was wanting, and granulation tissue was found in the vault of the tympanum. The dura appeared thick, but not discolored. There was some carious bone on the inner wall of the tympanum. The wound was closed without packing. The meatus was lightly packed.

On the 23d, the temperature was 100°, which was the highest reached. The patient complained of severe headache. The wound was infected, although the skin over the mastoid had healed by first intention. On the 27th of April the posterior wound broke down. On May 1st it was closed again. On May 16th the middle ear was perfectly dry, and the scar behind was barely visible. The fearful headaches of which the patient had complained had ceased. On January 30th the acoumeter was heard twelve inches in the same ear. On August 28th she had frontal and occipital headache, relieved by adrenalin and cocaine on the middle turbinates, which were pressing on the septum. October 5th, removed a large cystic middle turbinate on the left side. November 9th, occipital pain on stooping. Palpation of the sphenoidal sinuses caused sharp and severe occipital pain.

November 11th, much headache and both sphenoids extremely tender. Patient says that she tastes foetid pus in the morning, and has some yellow expectoration. Temperature 99.6° at 6 p. m. November 21st, on account of the great sensitiveness of the sphenoids, occipital pain, slight rise of temperature, and reported discharge of pus, both sphenoids were opened through the nose, under ether. They appeared to be normal. December 17th, interior of the nose well and no longer sensitive. January 5th, patient complains of choking swelling in the throat, especially at night, dyspnœa, and dysphagia. On inspection nothing abnormal found. The trachea and enlarged cervical glands were sensitive on palpation. January 15th, patient complains of lump in the throat like a marble, sometimes on one side and sometimes on the other, which bothers her a great deal, interferes with breathing, and is painful. No longer complains of headache.

The convalescence of the patient after the radical operation showed what might be expected in case a wound is infected when the blood-clot method is used. The convalescence was somewhat retarded, but the results appear to be practically as good as though no infection had taken place. The patient had had some objective symptoms of suppuration, inflammation, and swelling, and some signs of what appeared to be hyperæsthesia of the mucosa of the upper air tract, with painful reflexes, mingled with hysterical symptoms. The case shows how important it is to guard against misinterpretation of hyperæsthesia, which may simulate more serious conditions. It seems very probable that the excruciating headaches of which the patient complained, and which were relieved by the radical operation, were hysterical.

Report of a case of possible intracranial arterio-venous aneurism, or exophthalmic goitre.

The patient, a woman of about twenty-five years of age, was first seen, in consultation, in 1904. The history, given by a surgeon, is, that fourteen months previous to that time an attempt had been made to tie her left cavernous sinus. At that time he said she had pulsating exophthalmos. A diagnosis of arterio-venous aneurism was made, in the neighborhood of the cavernous sinus. The operation had to be discontinued on account of the severe bleeding, but not until the finger had felt a pulsation at

the apex of the petrous bone. In December, 1903, both common carotids were tied, within ten days of each other.

The history, as given by the patient, is that the left ear had annoyed her for about ten years, first with pain, later with tinnitus. She had a mastoid operation at the time, in Russia. She has suffered from dizziness and facial paralysis on the left side of the face for about two years. The dizziness is sometimes like "black water" before the eyes, and she apparently loses consciousness. The pain is located chiefly back of the left ear.

Physical Examination, July 13, 1904.—Exophthalmos is quite marked in both eyes. Scar on the left temple and another over the left mastoid, also one on each side of the neck where the carotids were tied. There is a pulsating area measuring 2 by 4 cm which can be seen behind the small pointed mastoid process. The visible pulsation extends down from the superior occipital curved line. The pulsation can be felt over a much larger area, as far as the spinous process of the fifth cervical vertebra. Pressure on the corresponding portion of the right side of the neck makes the tinnitus louder, patient says. Slight pulsation can be seen and felt in this area. Auscultation reveals a loud soufflé over the pulsating area of the left side of the neck. On the right side the soufflé is heard most markedly at the upper end of the right pulsating area, corresponding to the posterior end of the digastric fossa. Compression of the left external jugular with the finger diminishes the tinnitus but causes a large venous tumor to appear below the ear at the angle of the jaw, which perceptibly lifts the whole auricle. The arterial pulsations are strong and can be felt beneath the upper half of this vein, and a strong pulsating soufflé is heard on auscultation, especially in the lower half of the neck. Auscultation of the ear reveals a pulsating soufflé. The carotid sounds and pulsation were naturally very faint. Tympanic inspection shows the left tympanum obliterated, with some small compressible red tumors in front.

On the 17th of July the pulsating area had increased and could be seen extending from the angle of the jaw to the median line posteriorly from the border of the soft parts above and the trapezius posteriorly, down to the clavicle and in front of the median line. Pulsation over the left mastoid visible as high as 2 cm above the meatus, and pulsating vein runs anteriorly along the inner border of the left clavicle, also on the right side of the sterno-clavicular notches. The soufflé is heard about the left

clavicle and extends way up over the cranial bones. After the patient had rested and become composed for a few minutes, the pulsation and souffle diminished considerably. The souffle can be heard around the base of the skull as far as the right mastoid process. The heart sounds are heard as far as the upper border of the left clavicle. On the right side the souffle is heard in the superior-anterior triangle. Pressure on the right side increases the sound on the left. A vibration can be readily felt with the hand. Pressure on the pneumogastric slows and lessens the tinnitus. Left tonsil large and pulsating. Eye globes readily compressible. Lateral veins of the nose, temporal, frontal, and cheek veins large and prominent.

March, 1906. Complains of pain and dizziness in the head. Exophthalmos slight. Looks fairly well. Pain in the left side of the head and neck, which comes and goes. Pain has been worse the last two years. Pressure around the left mastoid tip stops the "buzzing." Left tonsil large. Auscultation shows occipital souffle loudest on left side. On March 20th, the symptoms are emphasized. Eight doses of 5-grain tablets of thyroid increased the symptoms beyond her moral endurance, which, together with the varying symptoms—sometimes better, sometimes worse—makes the case appear to be one of exophthalmic goitre rather than the earlier diagnosis, which was arterio-venous aneurism.

a. Report of a case of brain abscess following traumatism and acute mastoiditis. Operation. Recovery.

b. Report of a case of hysteria simulating brain abscess after operation for secondary mastoiditis. By ALFRED WIENER, M.D. (Published in full in this number.)

Treatment of otitis media acuta and mastoiditis by artificially induced hyperæmia. By S. J. KOPETZKY, M.D. (Published in full in this number.)

Discussion.—Dr. PHILLIPS said that he did not become easily enthusiastic over new methods of treatment, although he was glad to place his clinic at the disposal of those who were inclined to give such matters honest and thorough investigation. He had seen all of the cases which Dr. Kopetzky had been treating, and they were all undoubted cases of acute mastoiditis suitable for hospital treatment and gave indications that they might eventually require operation. It has been noted, however, that the

percentage of such cases which have cleared up without operation has been higher this winter than in past seasons. There were one or two interesting points in connection with this method of treatment that had impressed him very much. One was the very rapid and peculiar change in the character of the pus to a more watery condition. This took place in a short time after the application of the bandage. The prompt lowering of the temperature was another feature, although this frequently occurs after paracentesis and bed treatment. Another point was the relief of the pain. This, however, could also be claimed for a paracentesis and it was open to question whether the Bier method of treatment should receive all the credit of it, but the bandage undoubtedly relieved the pain immediately, and when removed the pain soon returned. The method, however was liable to do harm, and it should be used with great care and only by those experienced in the treatment of such cases. He did not think Dr. Kopetzky had sufficiently emphasized the fact that this method of treatment is contra-indicated when it is not promptly followed by a change in the character of the pus and lowering of temperature. The men who have written upon this subject have been more enthusiastic over it where there was an external periostitis with abscess formation. These cases they claim are almost universally cured by the Bier treatment. He himself was sceptical about this, but had just placed such a case with Dr. Kopetzky for treatment. The patient was a child about six years of age, with a large periostitis and a history of acute suppuration for three weeks. As there was already an opening through the external table and the child was not in immediate danger, it was considered suitable to try this method of treatment. A slight incision into the abscess was made and the bandage was applied, and the condition has subsided without a mastoid operation, though he was not yet confident that this might not be necessary later. He did not consider that the value of this method of treatment had been fully demonstrated, but it was only fair to give it a full trial. These experiments would be continued in his clinic for some time until they were thoroughly convinced in regard to it, and he hoped that others also would test its efficacy.

Dr. MYLES said that the subject was an exceedingly interesting one, and he was glad that Dr. Kopetzky had presented it before the Section. We are often impressed by the cause as well as the

cure of the conditions, pathologically probable, by the interference with the venous circulation, and whether it is due to an exosmotic current caused by pressure on the vein, and the escape of the serum from the venous circulation, or whether the serum is inimical to the bacteria, he did not feel able to say. In his experience, however, in studying the regions about the ear and in the different parts of the nose there are many contributing factors due to direct or indirect pressure upon the vein, not so much in the way of inflammation, but mechanically. He thought this method of procedure very dangerous for any one who was not extremely careful.

Dr. RAY (Louisville, Ky.) said that in his section of the country they were not so radical in their methods of treating acute suppurative cases of middle-ear disease as seems to be the practice in the Eastern cities, especially in hospital practice. In a very small percentage of cases was he called upon to do a mastoid operation for an acute suppurative process in the middle ear. He had often urged operation upon patients and had them refuse, and later see them get well without it. A prominent otologist in Louisville treats all such cases by the constant application of moist heat. He first makes a paracentesis and secures thorough drainage, has two nurses, if necessary, and maintains the constant application of moist heat. This treatment is kept up for two or three weeks, with the most satisfactory results. Dr. Ray has very seldom been called upon to open a mastoid in cases where he has had charge from the inception of the attack. The cases upon which he has operated were those which had been neglected and came to him with well-developed mastoid symptoms. Dr. Ray said he had seen one case where, as the result of long-continued hot applications, an external otitis had developed. He had been called in consultation to decide whether an operation was necessary, and had given his opinion that it was an external otitis from the long-continued hot applications. The pain later disappeared and the ear got well without operation.

Dr. BRANDEGEE said that he had been very much interested in the paper, but he did not see that it had been demonstrated that the cures were actually due to the Bier method of treatment. Here were six cases of acute involvement of the middle ear and mastoid. These cases were all of short duration, were well taken care of, and carefully watched. He did not know of any better treatment that could be given such cases. They were put to bed,

paracentesis performed, and hot chloride irrigation was maintained. There was no more rational way to treat an acute suppurative otitis media. The two-weeks-old case needed operation, but the other five cases were of extremely short duration and were promptly taken care of. Some cases do get well at times with local treatment. In most of the cases presented by the writer of the paper the most prominent symptom had been pain over the mastoid on pressure.

Dr. FRIDENBERG said that so far the reports in regard to the Bier treatment have been very enthusiastic, but it is well to bear in mind that disadvantages and ill effects are not published at first. It was only necessary to recall the history of morphoscopolamin anæsthesia. Keppler did not consider arteriosclerosis a counter-indication, yet it is undoubtedly a dangerous complication in a procedure which causes stasis. The possibility of cerebral hemorrhage must certainly be borne in mind, and in myopic eyes there is certainly danger of intraocular hemorrhage and of detachment. The Germans have recommended the Bier procedure, Dr. Fridenberg thought, without sufficient discrimination and without accurate indications as to dosage or discontinuance in cases of acute purulent otitis. Dr. Kopetzky's paper marks a distinct advance in that he lays down the valuable rule to give up constriction when the discharge does not promptly become serous, or when fever and pain continue. In regard to the cases he reported, it would seem that some of them were ordinary acute purulent otitis with the evidence of mastoid tenderness which is not uncommon in children. These cases generally get well with free paracentesis, especially if free drainage be assisted by evacuation of the tympanic cavity by suction—a method devoid of the dangers of Bier's treatment, but which has all the advantages of causing a free flow of fresh serum into the middle ear, assists drainage, and is not uncomfortable. It is to be noted in the cases reported by Dr. Kopetzky, in which there was evident prolapse of the postero-superior canal wall, operation became necessary. Dr. Fridenberg said that he wished to utter a word of warning as to the possible danger of Bier's treatment—the loss of time and the discomforts of constriction. It should certainly be applied, if at all, with the greatest caution. He disagreed absolutely with Keppler's statement that a new method should be applied promiscuously to as large a number of cases and variety of ailments as possible, even those which do not

seem to promise favorable results, in order to study effects and exclude the unsuitable cases. This method may be a good one in the laboratory, but it is out of place in the sick-room. On the contrary, the greatest care should be taken to apply a new method only where there is evident promise of success, and with clear indications. The welfare of the patient is of more importance than a rapid determination of the value of the method. The latter may proceed slowly but much more surely if it be applied scientifically and conservatively.

Dr. HARRIS said that he would like to add his testimony to what had already been said as to the great thoroughness with which Dr. Kopetzky had treated this subject, and the advantages which come from such careful investigation of any new method. There was much still to be desired in otological work, especially in the treatment of sinus thrombosis. The points which Dr. Brandegee had made could not be emphasized too strongly. Drs. Keppler and Kopetzky have failed to establish a control over their cases, and we are unable to decide how much of the favorable results are to be attributed to the method he has described and how much to the very excellent treatment accompanying it, in the form of rest, paracentesis, and hot douching. Another important point is the danger—not in the actual use of the bandage, but in the delay caused thereby. He had also been much interested in what had been said by several of the gentlemen in regard to the need of operation in all cases. Perhaps some of those present would recall a paper read by Dr. Pyle, about five years ago, in which he reported a series of cases of mastoiditis, which he followed up through the men who had referred the cases to him, all men of more or less prominence in the profession, and they stated that these cases, which were undoubtedly cases of mastoiditis, were well, and had been so for months and years without operation. The general opinion of the men who took part in the discussion at that time was that there was a great difference between the cases of mastoiditis in the country and those in the great hospitals of New York, and certainly they could not be expected to result in the same way. He much questioned whether it would be wise, as a routine measure, to say that we are justified in delaying operation in cases of acute mastoiditis showing well developed and characteristic symptoms. Those who see such cases on the operating table realize how often we get at them too late, and probably a delay of twenty-four hours

would endanger the patient's life. In the hands of such men as Dr. Kopetzky the patient would be safe, but the proceedings of the Section were read all over the country, and there was danger that others who were not so experienced or careful would endeavor to carry out this treatment with very evil results.

Dr. HELD agreed with Dr. Brandegee that Dr. Kopetzky's cases had received the most excellent care and attention, apart from the Bier method, and he thought that probably some of them would have recovered without the use of the bandage. He did not feel that the value of this method had been sufficiently demonstrated to be relied upon entirely to take the place of the ordinary accepted methods of treatment.

Dr. J. GUTMAN said that it was certainly difficult in such cases to decide whether the results were obtained *post* or *propter hoc*. He thought that the very best way to ascertain the real effect of the method would be to operate on a case and then apply the bandage, and note whether the wound healed more readily than is usual under ordinary treatment. He had not himself made this experiment, but had read of its being tried in certain diseases of the eye. So far as he could recall, however, no special effect had been noted.

Dr. GRUENING said that the last case which Dr. Kopetzky had mentioned would be of much value in deciding how much the results could be attributed to the Bier bandage and how much to the accompanying treatment. The relief of periostitis, which had been referred to, was rather an obscure question. This condition is not so common to-day as formerly, when the Wilde incision was much used. In retro-auricular abscess he generally found the bone very seriously diseased, but had not yet seen a case that was really a periosteal abscess.

Dr. KOPETZKY, in closing the discussion, said that he could not at the moment recall whether or not all of the cases reported seemed to demand immediate operation, but they were all severe cases, and in one of the private cases the instruments and assistants had been sent to the patient's house, but during the intervening time so great an improvement had been noted that operative measures were indefinitely postponed. Every one who does mastoid surgery is occasionally astonished on opening a mastoid to find therein a minimum amount of disturbance, and therefore it is very difficult to establish a satisfactory control. Dr. Harris regrets that no control was kept. An important question was—

How are we going to establish a control in studying this method? Take two ordinary cases of mastoiditis with the same symptoms, and one will clear up, while the other will not; or, in three cases, one will clear up without treatment, one will go on to operation, and one will clear up under dosage. What control have we to gauge the pathological changes going on in the mastoid? No absolute method exists for finding out the true condition present except by opening the mastoid, though we can be guided to a large extent by the clinical picture. Of the case still under observation, a child, pus was no longer evident in the wound, nothing but clear serum, and it was intended to remove the dressing the following day, and allow the wound to close up.

Regarding Dr. Brandegee's criticism that nothing had been demonstrated as resulting from the advocated method, but that the results obtained were ascribable to other excellent therapeutic measures undertaken, he holds that the evidence obtained from the rapid change in the clinical picture, the prompt dropping of the temperature, and the marked difference in the character and consistency of the ear-discharge were such that he is convinced these results are not alone due to excellent management of the cases, but to the influence of the induced hyperæmia, as no such results are observed in cases recovering under the usual methods of treatment. He calls attention furthermore to the remarkable shortness with which complete re-establishment of ear function is obtained as compared to results obtained in resolving cases, and therefore he must take issue with Dr. Brandegee, and say that while the results may have been aided by the other treatment given, a decided action directly attributable to the hyperæmia is evident. In the series of experiments he had limited himself to such cases as previous experiments had shown could be successfully treated by the Bier method. Chronic cases that have been opened after the application of the Bier bandage showed a sharp line of demarcation between the diseased and the healthy parts of the bone—a line almost like that in cases of gangrene. He had not tried the method on any chronic cases. There are extant other observations of the result of the method in throat and sinus cases; beneficial results from the application of the bandage are noted in these also. The method was absolutely dangerous in the hands of the inexperienced, and should not be attempted by such. The very fact that rapid changes have been observed indicates that something has been going on,

and this would naturally lead to the conclusion that if we are competent to observe the results of treatment of ear diseases, and we know that acute cases coming early under observation will almost invariably heal up when the Bier bandage is applied, then competent men should try the method; and he believed they would cure their cases more frequently with its aid than without it. One should not take sides on such questions, but should observe and study a subject broadly, and report results.

CLINICAL MEETING, MAY 10, 1906, DR. GRUENING IN THE
CHAIR.

Two cases of exsection of the lateral sinus and jugular vein. T. PASSMORE BERENS, M.D.

T. O., age twenty-one. Admitted to the Manhattan Eye, Ear, and Throat Hospital, July 24, 1905. History of six or seven years of discharge from the right ear from unknown cause. For a week had been confined to bed with pain in and about the ear, with headaches, fever, and vomiting. Patient appeared extremely ill, with the typical appearance of sepsis. Temperature 102.5°. Mastoid tender on pressure; posterior superior canal wall bulging with a free foul-smelling discharge of pus exuding through a large perforation in Shrapnell's membrane; no tenderness or swelling in the neck; eye-grounds normal. Microscopic examination of a smear of pus from the ear showed a mixed infection. A Schwartze-Stacke radical operation was performed. During this operation a large extradural abscess was laid bare above the tegmen et antri, and communicated with the attic and antrum by a perforation through the bone. This abscess cavity was continuous with a perisinusitis of the sigmoid sinus, which was covered with granulations and was almost entirely collapsed; it contained pus which was walled off about an inch behind the knee by a partially organized clot, while below a similar clot extended into the bulb. The jugular was tied below the facial, and exsected after tying the latter. It contained no clot, but much difficulty was experienced in securing drainage through the bulb. The wound in the neck was treated after the open method, it and the mastoid being packed with iodoform gauze. The external walls of the sigmoid sinus and an inch of the lateral sinus were removed, after the posterior plug was inserted. The case made an uneventful recovery, excepting that he has refused a

plastic operation on the soft parts, and there is still an occasional discharge from the Eustachian tube. A study of the temperature chart is interesting in that it shows an extreme elevation of only 101.5° . This may be accounted for in one of two ways: either that the case was seen and operated upon during a remission, or that the circulation was so completely cut off by the organized clot as to prevent absorption of sufficient septic material to cause a higher temperature.

W. C., aged fifteen. Admitted to the Manhattan Eye, Ear, and Throat Hospital, February 10, 1906. The left ear had been discharging since infancy, probably from scarlet fever. Had had pain and tenderness in the mastoid for four days, and had had considerable malaise and some chilliness. Temperature 98° ; free discharge of foul pus through a large perforation, and bare bone was present in the attic. Patient was confined to bed. The next day, after some chilliness, the temperature rose to 102° and a radical Schwartze-Stacke operation was performed. The antrum was large and contained much foul pus; the mastoid was sclerosed throughout excepting in its extreme depth, *i. e.*, on a level with the floor of the antrum, where a series of communicating cells with necrosing walls was found lying against the inner table and communicating with the antrum above and the sinus below near the bulb. The sinus was seen at this point to be discolored a deep greenish hue; its further exposure revealed a perisinuous abscess, but the sinus except at the one discolored spot was not far from normal in appearance, excepting for a whitish mottling. The sinus was unusually large and very tortuous. It was incised and great difficulty was experienced in controlling the hemorrhage—indeed this was so free that normal saline solution was administered intravenously and the operation was discontinued. The patient rallied, however, and when the temperature reached 104° next day, the jugular was tied below the facial and the external walls of the sigmoid sinus were removed to about an inch and a half behind the knee. No clot was found. The pathological report on the portions of the sinus walls and the jugular was: "Many small areas of necrosis are present." The case was one of mixed infection. He made an uneventful recovery, and while the wound is not entirely dermatized, still he is attending to his work. The particular interest in this case is that there was a distinct phlebitis of the sinus present, without visible clot formation.

The two cases illustrate rather extremes in this class of cases, and for this reason were presented.

Discussion: Dr. GRUENING said that the most interesting point was that there was a thrombosis with a temperature of 101°. That is unusual. Of course it may have been an uninfected thrombosis. The sigmoid was opened and no clot was found. Dr. Gruening thought that this was not infrequently the case and had performed the operation three times this winter without finding a clot. The wall of the sinus, however, showed that the sinus was diseased. Some one has said that when the incision is made the clot and thrombosis are manufactured, and then the jugular is exsected. This is certainly not so. Another interesting feature in Dr. Berens's cases was that he tied the jugular in both instances below the facial. Dr. Arnold Knapp read a paper before the Section during the winter, stating that the jugular should be tied above the facial. It would be well to have a discussion of the reasons for this difference of procedure.

Dr. RICHARDS, referring to the statement that we should as a practice ligate the jugular vein above the point of entrance of the facial to save the facial as a compensatory avenue in order to avoid the dangers arising from faulty venous return flow, said that he regarded this as an extremely dangerous procedure. It is not in accordance with what the pathological findings in these exsected jugular veins teach us. Serious circulatory disturbances following total jugular resection are very rare. He had on two occasions—once in a child, once in an infant—obliterated both sigmoid sinuses at the same sitting without causing any noticeable disturbance whatever in the circulation. On the other hand, it is very common to exsect a jugular vein which at operation appears normal but which is later found to be involved in extensive partial thrombosis or which has its walls invaded by bacteria far beyond the limits determined by the naked-eye appearance. It is the safer practice to resect the jugular vein as low down in the neck as possible.

Dr. BERENS said that Dr. Richards had covered the point about the tying of the facial vein. At the last meeting of the Otological Society he had reported a case of descending phlebitis which had started in the sigmoid and travelled down to the vena cava, causing death by sepsis. He therefore made it a point to tie the jugular as low down as he dared and then exsect it, so that if there is any bacterial infection of the vein he might be

certain to get it out. It was not uncommon to operate on a lateral sinus thrombosis during a remission of the temperature. As Dr. Richards had said, the patients come in with a low temperature and are operated at once. If such cases were delayed for twenty-four hours there might be a temperature of 105° or 106° .

Dr. RICHARDS said that cases of septic sinus thrombosis with a low temperature were not sufficiently infrequent to be of particular interest. If the septic thrombosis be blocked on both torcular and cardiac sides by protective clots we expect little temperature, as the area of infection is more or less isolated from the general circulation. Within the past few weeks he had operated upon a case in which the highest temperature was under 100.6° and yet the whole external wall of the descending sinus limb had ulcerated away, leaving the inner wall of the sinus completely bare. A year ago he operated on a similar case in which the centre of the thrombus corresponding to the middle of the descending sinus limb had broken down into a purulent collection. Blocking this on both torcular and bulb sides were protective clots. The case was under observation for a week or ten days prior to operation, and the highest recorded temperature was subnormal. The patient was a woman about seventy years of age who had in addition to the sinus lesion an extensive epidural abscess.

Dr. GRUENING said that the teaching of the Halle school was to tie the jugular above the facial; here we tie it below and as far down as we can. This was his own practice and he had never seen any circulatory disturbance follow it. He had had a case of thrombosis of both lateral sinuses, where the jugular was tied low down on one side and not at all on the other, though the thrombus was removed. The patient got well. In his opinion the fear of disturbance of circulation following the tying of the jugular is unfounded.

A case of restoration of protruding auricle by plastic operation: with photographs taken before and after.

A. B. DUEL, M. D.

Dr. DUEL said that some of those present would remember a case he presented about six months before, in which a similar plastic operation had been done for the correction of a protruding auricle in an infant. The point of interest was that the deformity

had been corrected by the removal of an elliptical skin flap from the posterior aspect of the auricle and scalp behind the ear, and then drawing the edges together, without recourse to the removal of any of the cartilage as in the usual operation where the deformity was so great. The advantage of this method is that it obviates the danger of a possible chondritis, and the consequent sloughing of the parts, which might produce a deformity much greater than the original condition. The present case was shown as a confirmation of the possibility of correcting all such deformities without the removal of any of the cartilage. As could be seen, this boy had a most marked protrusion of the auricles, which the operation had perfectly corrected. The union on both sides was by first intention.

In response to a query as to how much skin had been removed from the auricle and how much from the adjoining region, Dr. Duel replied that at the widest point the skin was nearly an inch across. The amount to be removed was determined by grasping the skin on the posterior aspect of the auricle with a pair of rat-toothed forceps, producing a fold in the cartilage by carrying it as far back toward the hair line as seemed necessary to hold the auricle in proper position. The two places were then marked by the rat-toothed forceps, the included elliptical piece of skin removed, and the raw edges brought together by silk sutures.

A case of persistent torticollis following mastoid operation. PHILIP D. KERRISON, M. D.

The patient, a girl of seven years, was admitted to the Manhattan Eye and Ear Hospital on February 6th. Her previous history was negative as to the infectious diseases. Had never had aural discharge, but at various times had suffered from earache. In November last she had an attack of acute articular rheumatism. During this attack she complained of earache, which, however, subsided without rupture of the drum membrane.

History of present attack. On February 1st child suffered from pain in the right ear, which persisted during the night and prevented sleep. On the following day there was spontaneous rupture of the drum membrane and cessation of pain. On account of recurrence of pain she was admitted to the hospital on February 6th. Examination of the right ear on that date revealed the following condition: The drum membrane was

red and bulging; the bulging was particularly marked in the upper and posterior quadrant, and the postero-superior canal wall was somewhat swollen. There was considerable sensitiveness to pressure over the mastoid. A small perforation in the postero-inferior quadrant was evidently insufficient to allow free drainage. The temperature was only 100.4° .

Treatment.—Under somnoform anæsthesia myringotomy was performed. Examination of the pus following the incision showed both streptococci and staphylococci. The child was put to bed and the canal irrigated at regular intervals with bichlorid of mercury 1 in 4000. On February 9th, the mastoid tenderness being still marked, mastoidectomy was decided upon.

Operation.—The mastoid was exposed and the cortex removed in the usual way. Pus was found in the antrum and tip cells. The intermediate cells contained granulations, and the bone covering the lateral sinus was markedly necrotic. The lateral sinus was exposed over a space of $\frac{5}{8}$ of an inch and was perfectly normal in appearance. The operation was completed in the usual way, the tip and zygomatic cells being thoroughly removed. The recovery has been uneventful except in the development of one symptom, namely, a very persistent and very distressing torticollis. This was noticeable on the third or fourth day and became progressively worse until some three or four weeks after the operation the proper dressing of the wound became a very difficult matter. In order more thoroughly to search for the cause of this symptom, it was decided at this time to place the patient under the influence of an anæsthetic. Under full ether anæsthesia the head became perfectly relaxed, falling by weight as readily to one side as the other. The wound was apparently healthy and no focus of infection was discovered. On or about April 15th, she was sent to Dr. Sayre for treatment. Dr. Sayre placed the child in a plaster jacket, and immobilized the head as nearly as possible in its normal erect position by a plaster helmet. The relief which the patient experienced from this treatment seems to have been immediate. It also seems to preclude the possibility of any permanent contraction of the muscles of the afflicted side.

Discussion: Dr. SAYRE said he had been very much interested in this case, as he had seen several similar cases where the position resembled that of torticollis, but where the condition causing it was quite distinct from that which produced the ordinary variety of torticollis. Torticollis, as generally understood, is a

twisting of the neck caused by the contraction of the muscles on one side of the neck ; the sterno-cleido-mastoid being usually the principal muscle involved. These cases are frequently congenital, or occur in very early childhood, and the question of etiology has been very much discussed. Several observers have noticed a hæmatoma in the sterno-mastoid before the occurrence of the torticollis, and have advanced the theory that in consequence of the injury which produced the hæmatoma, a scar is formed in the sterno-mastoid, which subsequently contracts, causing the inequality in the length of the muscles of the different sides of the neck, while others allege that some interference in nutrition prevents the growth of the muscles on one side of the neck and that in consequence the head is twisted to one side. In certain other cases of torticollis, the deformity comes quite frequently after injuries or exposures to draughts by apparently setting up a peripheral neuritis. A third class, of which the present case is a sample, are caused by inflammation of the upper cervical spine with spasm of the muscles controlling the inflamed joints, and present a distortion which resembles very closely the position of true torticollis, except that the face is usually directed somewhat downward rather than upward. The speaker regarded this case as a metastasis from the mastoid to the upper cervical spine, and had seen similar cases following tonsillitis and middle-ear inflammation without suppuration in the mastoid.

These cases of inflammation of the upper cervical vertebræ were formerly supposed to be very rare, but the speaker believes this view to be due to the failure to recognize the cases, as he had seen a large number of them since his attention had first been drawn to the peculiar symptoms present in this variety of cervical inflammation. Almost all of these patients have difficulty in fully opening the mouth. They are not willing to lie upon the back, and resist violently efforts to place them in a recumbent position, often saying that they felt as if they were going to die if placed there. He explains this by the fact that the recumbency causes pressure of the body of the first cervical vertebra against the odontoid process, and so intensifies the pain which in other regions of the spine is relieved by the recumbent position. The particulars of treatment to be applied, are rest and protection, and these were best obtained by the use of a plaster of Paris helmet applied in the position of deformity. After a few days the neck of the helmet is cut through parallel with the ground,

and the head straightened as far as possible, being retained in this position by a fresh plaster of Paris bandage ; this procedure being repeated at intervals of a week or so until the deformity is corrected. The support must be maintained as long as any inflammation is present as shown by the occurrence of muscular spasm. In cases of tuberculosis, the period of rest would be about two years. In staphylococcus and streptococcus infection, the period of a few months usually is sufficient for cure. Several photographs were exhibited showing torticollis due to muscular contraction as well as to tuberculosis and acute metastatic infection.

Dr. GRUENING said that this was a very interesting question, considered from the standpoint of the orthopædist. Do the otologists also resort to orthopædic measures? These cases were not especially rare, and in his own practice he had seen this condition several times, though none of these cases had been so pronounced as in this child. These cases had occurred at a time when he did not remove the tip of the mastoid, and upon examination he found that the sterno-cleido-mastoid muscle was attached to diseased bone. All of these cases had occurred before 1890, but since that time he had made a practice of removing the tip as well as the other part of the bone, and he had not seen the condition. Of course, that did not apply to this case, for Dr. Kerrison especially mentioned that the tip had been removed, so there must be another cause for the torticollis.

A case of perichondritis following radical operation. Deformity prevented by removal of cartilage. By LEE M. HURD, M.D.

Dr. Hurd said he presented this case in order to show the good result following this method of treating a perichondritis, following the radical operation, rather than leaving it alone. Four weeks after operation this girl showed a swelling around the new meatus. This was treated by the application of a wet dressing for two days, but on the third day it was worse, and the swelling was then incised, going around the concha, from the antihelix to the antitragus, and a piece of cartilage a little larger than a nickel was removed. The edges of the remaining cartilage were examined to see if it was good normal tissue. Five days later a skin grafting was made, and a perfect result was obtained, excepting that there was a slight contraction of the meatus. There were very persistent granulations inside, and it

was difficult to keep them down. The perichondritis was so marked that the concha bulged out, rather than concaved.

A patient with an acute tympano-mastoiditis. Complete opening of the mastoid. Recovery by primary union.

By HERMAN KNAPP, M.D.

Dr. Knapp said he regretted very much that the patient had failed to appear. The case was one of acute otitis and mastoiditis. There was tenderness of the tip, but this symptom is of small value and does not always require operation on the mastoid, if time was allowed for observation. In my patient the tenderness increased, and the rise of temperature evidently showed systemic disturbance, so a complete mastoid operation was done, according to Whiting's method. Beginning with the zygomatic cells, nothing was found and nothing in the region of the antrum; going down toward the tip, which was laid bare, the superficial cells were healthy, but in the lowest medial tip-cells the pus was found. The wound was cleaned out and closed. Four or five days later there was some suppuration in the tip. The wound was reopened, and granulation tissue was found, but there did not seem to be any carious bone. It was cleaned out with a chisel and a curette. There was no further suppuration, and the patient is now in excellent condition.

A few days later there was a case with exactly the same history, excepting that the tenderness was in the middle of the mastoid, over the antrum. A complete operation was made, and pus was found in the antrum itself, but nowhere else. The wound was cleaned out and stitched. For four or five days the wound looked as if it would heal by primary union, but upon careful examination it also showed some suppuration, and had to be opened again and treated in the same way—the granulations removed, the wound cleansed thoroughly and closed; in two or three days everything was clean, and the recovery was uneventful.

In both cases the wound was reopened and packed very slightly with gauze, which was quite sufficient to bring about satisfactory healing.

These cases reiterate, what we all know, that it is not always safe to trust the cutaneous healing over a wound. It may be all right when we are sure that all carious bone has been removed; but even if we don't succeed absolutely, and leave a small portion of the mastoid, which later gives trouble, it is not very difficult to cleanse it, when all the rest is nicely healed by primary union.

In the future, when I see such cases, I shall as a rule make a complete opening, and if only a limited focus is found, I shall clean it out thoroughly, put in a tampon, and suture the rest of the incision.

Discussion.—Dr. BRVANT said that, apropos of the blood clot, during the past three years in all the cases he had operated upon, with whom he was free to use his own choice, he had employed the blood clot. Many of the wounds he had not closed entirely but had left a small cigarette drain in the lower corner, and in no case had the wound been reopened excepting one, where it was necessary to extend the operative field. He thought that wounds healed a great deal quicker when treated with the blood clot, but that possibly infection was better avoided by the use of the drain, combined with the blood clot. The cases where the wound was infected, after the operation, did not seem to have their convalescence delayed by not having had the wound packed, and had a much better cosmetic effect. The clot broke down readily, and the drainage was very free. These cases he did not pack, even after infection. A case operated upon five days ago, where the involvement was extensive and the dura uncovered in both fossæ during the operation, was already healed and dry, both in the meatus and the mastoid wound.

Dr. DUEL said that he had heard a great deal of discussion about the blood clot, but in many of the cases which he saw he would not dare to close the wound up, owing to the fact that, in doing a thorough operation, he frequently exposed a large area of the sinus, and frequently a portion of the dura; he had always found it impossible, when a large number of pus cells were evacuated, as in most mastoid cases, to so thoroughly clean it out that no infection was left. He could see how it might be safe to make an effort to close a wound by primary union by blood clot, where the dura was not exposed, because, if it should break down, as Dr. Knapp had said, it simply amounted to reopening a skin wound and curetting the case again.

Dr. HASKIN said that he had recently operated on a patient, with exposure of the dura, where the patient had recurrent attacks of mastoiditis since childhood, being now twenty years of age. A small mastoid process was found. The posterior wound was closed with a silkworm-gut suture, and the patient is entirely well, the wound having healed by first intention. The patient has had a furuncle in the canal, but this has not affected the

mastoid wound. She left the hospital on the fifth day, and when seen on the sixteenth day appeared perfectly well.

Dr. GRUENING said that after hearing Dr. Blake of Boston read a paper on the treatment of the mastoid wound by clot, he had tried it several times but had failed in his attempts, and was obliged to reopen the wound in almost every case, though he did have small areas in which the healing took place, but he finally concluded that the open method would be safer in every case. General surgeons sometimes use this method in connection with the long bones, and they also are obliged to reopen the wounds very frequently. To reopen a wound in a private house is a very serious matter—almost equivalent to another operation, though in a hospital it is a very simple procedure. He felt, however that it was safer not to be obliged to reopen the wound.

A case of suppuration of the internal ear associated with chronic purulent middle-ear disease. By J. D. RICHARDS, M. D.

This patient, a boy, was operated upon about a year and a half ago for subperiosteal abscess complicating a chronic purulent middle-ear disease. The interior of the mastoid was filled with a cholesteatomatous mass which invaded both antrum and tympanum. The external semicircular canal had lost its ivory-like cap and granulations were springing from its interior. The posterior wall of the bony canal was necrotic down to a level below the facial canal. This necessitated the complete exposure of the facial nerve from the floor of the auditory canal to its point of emergence from the inner tympanic wall. On clearing out the tympanum a bud of granulations was seen springing through an opening in the centre of the promontory, and on shoving this granulation mass aside pus exuded from the internal ear. The whole semicircular canal system was removed. Granulations were found in all the canals, but no pus. The petrous portion of the bone, which was pneumatic, was removed as far forward as the carotid artery. The internal ear, which was involved throughout, was entirely ablated; the facial nerve was exposed as far inward as the internal auditory meatus. About a quarter of an inch of the carotid artery was exposed as it lay in the carotid canal.

No pulsation of the exposed artery was to be seen. This absence of pulsation immediately suggested the importance of the carotid canal as a bumper in protecting the brain from

arterial shock. He had operated on two other cases similar to the present one, and in none of these was there any noticeable pulsation in the carotid artery as that vessel lay exposed in the carotid canal. On emerging from anæsthesia there was a slight facial paresis, but neither vertigo, vomiting, nor nystagmus. On the following day the paresis had developed into complete paralysis. On the third day the wound was dressed and it was noticed that a hemorrhage had occurred beneath the sheath of the nerve. Disturbance of equilibrium was at no time general. The facial paralysis continued for three or four months, when improvement began. At the present time it has practically disappeared.

A case of mastoiditis with large subperiosteal abscess and epidural abscess, drum membrane normal, hearing good. By JOHN MCCOY, M.D.

Mr. Wm. B. M——, male, age thirty-eight years, entered the N. Y. Eye and Ear Infirmary March 31, 1906, and gave the following history. About twelve weeks previous to entering the hospital he had an earache which lasted about twenty-four hours and subsided; after this he thought there might have been some moisture in the canal for a few days but was not sure. Following this he had a feeling of fulness in the ear and heard sounds of a roaring nature. About four weeks previous to entering the hospital he noticed a swelling back of the ear which was quite painful and which gradually extended up on his scalp. At the time of entering the hospital the cellular tissue over the mastoid was indurated and there was a fluctuating tumor extending from the mastoid almost to the vertex. On examination of the drum membrane it was seen to be slightly congested in its upper portion and along the long process of the malleus, otherwise the membrane appeared to be normal. The external auditory canal was also normal. He could hear the watch at fifteen inches. Temperature was $100\frac{1}{2}^{\circ}$ F.

Operation, March 31, 1906. The usual curved incision was made over the mastoid and a posterior incision made from this extending up toward the vertex about two and a half inches. About two ounces of pus were evacuated and a perforation was found in the mastoid cortex about 3-4 inches back from the canal. The mastoid was entered from this point and was found to be thoroughly necrosed; it was removed down to the inner plate; the inner plate was found to be deficient over the sinus and

the dura over the sinus was found to contain granulation tissue and pus on its surface about a half inch below the knee of the sinus. The patient is making an uneventful recovery. No record of the micro-organism found in the history.

A case of serous meningitis mistaken for brain abscess : operation ; recovery : presenting several interesting features. By LINN EMERSON, M.D.

The interesting features in the case are as follows :

1. Serous meningitis being mistaken for brain abscess on account of symptoms pointing to the latter condition.
2. The recovery of the patient.
3. The marked improvement in hearing in an ear possessing a long-standing chronic catarrhal otitis media as a result of the destruction of the drum by suppuration and a mastoid operation.
4. The cure of an epilepsy of fourteen years' standing as a sequence of the operation.

The history is as follows :

Mrs. E. H., aged thirty-eight, mother of six children, five of whom are living and well. Eldest child died of diphtheria at the age of three. Father died in 1899 of apoplexy, age not stated. Mother living and well. A paternal aunt has suffered from epilepsy since the age of fourteen years. The first epileptic attack occurred June 16, 1890, four days after the birth of her third child, and patient can assign no reason for this attack. Attacks are said to have been very severe at times, and about a year preceding the present illness the patient was in the Orange Memorial Hospital and diagnosis of status epilepticus made.

She came to the Orange Memorial Hospital Dispensary November 15, 1904, with a history of left-sided acute otitis following grippe. Her family physician had performed a paracentesis of the membrana tympani, and treated the discharging ear in a proper manner for one week, but, mastoid symptoms supervening, he sent her to me for further treatment.

Patient was very deaf in both ears, had been so for several years, and heard only very loud voice. The condition of right *Mt.* indicated a chronic catarrhal process of long standing, and it is reasonable to suppose the same condition had been present on the left side.

She was at once admitted to the hospital and vigorous anti-

phlogistic measures employed, but as no amelioration of the mastoid symptoms occurred, a mastoid operation was performed November 18th, three days after admission. (15 gr. potassium bromid, t. i. d., which she was taking before admission, was continued.)

There was considerable pus and granulation tissue found, the condition being that usually found in such cases. However, just at the close of the operation, too vigorous pressure with the curette broke through the bony wall over the sinus and a wound of the sinus occurred. Hemorrhage was brisk, but easily controlled, and after slightly enlarging the opening in the bone, the sinus was packed with plain, sterile gauze.

On the day following the operation the afternoon temperature was 100° F., on the second day 102° , and on the third 101° , when the outer dressing was changed. On the fourth day it was 100.8° and on the fifth it was 99° , when the packing was removed from the sinus without any recurrence of the hemorrhage. The case now made satisfactory progress for three days, but on November 26th there was a slight afternoon rise of temperature, and on the 27th it was 102.4° , and the patient complained of headache on the side involved. On the 28th it was 103° and on the 29th 100.4° , with increase of headache and inability to sleep on account of the pain in the head. From this time forward temperature did not reach 100° at any time.

The headache grew worse, head tenderness, particularly on percussion, occurred. Left-sided optic neuritis was first observed December 1st, and made rapid progress. On December 8th divergence of the left eye occurred and became more marked on the 9th and 10th.

The patient slept very little these last few days. While she never vomited she was frequently nauseated, and anorexia was complete. As she was failing rapidly, it was evident that operation was inevitable. The progressive slowing of the pulse, which was but 50 on the morning of the 10th, was the deciding factor.

On Sunday morning, December 11th, left temporal lobe was exposed by a flap turned down, with trephine and rongeur. The dura bulged markedly, but appeared healthy. On incision several drachms of clear serous fluid escaped under considerable pressure.

The brain appeared healthy, but several deep incisions with

a narrow bistoury were made in various directions without result.

I was very much chagrined at the result of the operation until the almost miraculous improvement in the patient's condition manifested itself.

The respiration, pulse, and temperature on the second day became normal and remained so.

On the third day the wound was dressed (the outer dressings had been changed several times on account of the free flow of cerebral fluid), but the gauze drain was left for one week.

The day following the operation the patient was free from all her distressing symptoms, and was out of bed on the third day.

She made rapid progress and left the hospital January 1, 1905, three weeks after her second operation. On January 16th both wounds had closed completely, the aural discharge had ceased and she could hear ordinary conversation with her left ear.

Under date of April 24, 1906, she writes me that she still hears well, and had had no attack of epilepsy since her last operation, a period of sixteen months.

Whether she will remain free from her epileptic seizures is a matter for conjecture and further observation.

While this case is no particular credit to me as a surgeon, I feel that the many interesting points observed justify its presentation.

Dr. BRYANT showed a **salpingoscope** for the Eustachian tube. He stated that it had been of considerable use to him in the examination of patients, in forming a diagnosis, and also in observing the results of treatment, the functional action of the Eustachian tube, and the morphological conditions of the fossæ of Rosenmüller and the naso-pharyngeal structures. A view of the larynx could be obtained as well as of the upper fossæ of the nose, and it could be used for transilluminating the maxillary and frontal sinus.

BOOK REVIEWS.

III.—Operative Otology. Surgical Pathology and Treatment of Diseases of the Ear. By CLARENCE JOHN BLAKE, M.D., Boston, and HENRY OTTRIDGE REIK, M.D., Baltimore. D. Appleton & Company, New York and London. 349 pages. 1906.

This is the third American book on Operative Otology which has appeared in a short space of time. In the preface it is stated that the book is "rather a record of individual experience than a review of the literature of the subject."

The book starts with a chapter on surgical anatomy, illustrated by some excellent reproductions of mastoid bones and less successful photographs of head sections. The second chapter is on surgical technique, and supplies general surgical information, presumably for the aural specialist who has had no surgical training. Then follows a description of those conditions of the auricle, auditory canal, tympanum, and mastoid process, which may require surgical intervention.

Among the indications for operating in mastoiditis, p. 177, importance is laid (6) upon finding streptococci in the aural discharge and (7) leucocytosis in the presence of mastoid symptoms. Though these conditions are of certain corroborative value, their importance must not be exaggerated, as they never can replace the classical mastoid symptoms. The mere finding of a certain bacterium can never give an indication for operation, as it is not the kind of organism, but its virulence, which is of importance, the virulence depending, as is well known, upon a number of different factors. It is now accepted that leucocytosis is not always proof of the presence of suppuration, but it is the increase in the percentage of the polynuclear form in its relation with the general leucocytosis which is of value.

The chapter on middle-ear operations brings a number of valuable features with whose development the name of one of the authors will always be associated.

Under the heading of adventitious aural surgery, the subjects of adenoids, infusions, and lumbar puncture are treated. An

appendix brings a number of articles on special subjects, partly in the form of reprints, which include "The Localizing Symptoms of Brain Abscess," by Dr. G. A. Waterman, of Boston; "The Removal of the Stapes for the Relief of Auditory Vertigo," by Dr. E. A. Crockett, of Boston; "Hearing-Tests as an Aid in Locating Tympanic Lesions" and "Surgical Exploration of the Labyrinth after the Method of Julian Bourguet."

A. K.

IV.—Lehrbuch der Ohrenheilkunde für Aerzte und Studierende ("Text-Book on Otology, for Physicians and Students"). By Dr. F. BEZOLD, Professor of Otology, Munich University. 346 pp. Wiesbaden, J. F. Bergmann, 1906.

The subject of Otology is presented in thirty-two lectures designed for the use of physicians and students. The author's style is clear and scientific. Three lectures are devoted to the functional examination of hearing, with an introduction on physiologic acoustics, which, coming from a master on the subject, will be read with interest and profit by many. Of operations only those are described which the general practitioner may be called upon to perform. The chapters on Diseases of the Internal Ear have been written by Professor Siebenmann, of Basel. The book contains seventy-five illustrations in the text and one plate of pictures of the drum-membrane. It is dedicated to Von Tröltsch, as founder of Otology, whose picture is given on the frontispiece. The get-up of the book is the usual excellent one of the publisher.

A. K.

ARCHIVES OF OTOTOLOGY.

SOME POINTS IN THE DIAGNOSIS OF THE COMPLICATIONS OF TEMPORAL-BONE DISEASE BASED UPON A STUDY OF 135 FATAL CASES.¹

By A. L. WHITEHEAD, M.B., B.S. (LOND.),

AURAL SURGEON TO THE GENERAL INFIRMARY AT LEEDS ; CLINICAL LECTURER
IN OTOTOLOGY AT THE UNIVERSITY OF LEEDS.

ISOLATED cases of intracranial suppuration which have been brought to a successful issue are frequently published, but a careful study of the symptoms in these cases is rarely instructive ; either the symptoms were of the most obvious character or else the cases recovered by a fortunate association of fortuitous circumstances.

During the last fifteen years, 892 cases of temporal-bone disease were operated upon at the General Infirmary at Leeds by our predecessors, my colleagues, and myself. Of these cases 146 died.

A study of these fatal cases, where careful post-mortems revealed lesions in some cases unsuspected during life or with symptoms rendering a correct diagnosis a matter of the greatest difficulty, presents many interesting features. I regret, however, that I have no very striking or epoch-making conclusions to lay before you.

Of the 146 cases, 11 died from other causes, such as diabetes, cardiac disease, etc. In the remaining 135 cases, death was more or less directly referable to the temporal-bone disease.

Eleven cases died from exhaustion ; ten of these were

¹ Read before the Otological Society of Great Britain, Leeds, June 23, 1906.

wasted infants under one year old ; all had very extensive mastoid disease and subnormal temperature after operation, and died of inanition in from ten to thirty days afterwards. In 2 of these cases necrosis of the labyrinth was found. The eleventh case was $2\frac{3}{4}$ years old and had chronic diarrhœa with acute mastoid abscess associated with vomiting, rigors, retraction of neck, drowsiness, and constipation. She was almost moribund on admission to the hospital, revived under stimulants, but died of shock at the completion of an extensive operation.

Nothing abnormal in the brain or elsewhere was found at the post-mortem ; a culture of the pus gave no growth. In this case the symptoms pointed to intracranial suppuration and it was necessary to explore the brain ; the prolonged operation undoubtedly proved fatal, but a less complete operation would not have been justifiable.

In young children with defective stamina, it is certainly wiser not to aim at complete removal of all disease at one operation ; the establishment of good drainage and the removal of the more serious disease should be accomplished at the first stage, and at a later period a more complete and satisfactory radical operation performed.

In 2 cases no obvious cause for death was discovered at the post-mortem. One case where persistent vomiting, optic neuritis, coma, nystagmus, and conjugate deviation of the eyes were present I have already reported to the Society.

In the second case two serious and alarming hemorrhages, with persistent uncontrollable oozing from the whole of the wound in the bone and not at all from the soft parts, were followed by jaundice, temperature of 102° , and collapse ; the organisms obtained from the pus were streptococci, and anti-streptococcic serum was injected without success. At the post-mortem no gross lesion of any organ was found. Probably in both cases an acute septic infection caused death.

In 22 cases, acute miliary tuberculosis caused a fatal issue ; in 18 the meninges were affected and the symptoms those of tubercular meningitis.

In 8 of the 22 cases some other primary forms were present, but in the remaining 14 the temporal-bone disease

seemed to be the sole focus of infection. Nineteen cases were under two years of age; in every case either symptoms of tuberculous meningitis or distinct evidences of general tuberculosis were present before operation, and in no case could the operation be regarded as the originating cause of a general disseminated miliary tuberculosis.

In 5 cases when admitted, an ordinary catarrhal pneumonia complicated an acute mastoid disease following upon chronic otorrhœa, the pneumonia proving fatal.

In 3 cases an extradural abscess situated over the sigmoid sinus was evacuated during the mastoid operation, death subsequently ensuing from septic broncho-pneumonia.

In these cases rigors and remittent temperature had preceded operation but the sinus was found to contain fluid blood. No septic thrombus or alteration in the vessel wall was found post-mortem, although the infection must clearly have been conveyed through the sinus. No uncomplicated case of extradural abscess died.

Of the remaining 93 cases, serous meningitis was present in 1, general meningitis in 33, meningitis and sigmoid sinus thrombosis in 10, meningitis and cerebellar abscess in 5, meningitis and temporo-sphenoidal abscess in 6, sigmoid sinus thrombosis alone in 1, with pneumonia in 9, with cerebellar abscess in 7, temporo-sphenoidal abscess and thrombosis of the petrosal sinus in 1, temporo-sphenoidal abscess alone in 8, temporo-sphenoidal abscess and cerebellar abscess in 2, and cerebellar abscess alone in 10.

The accompanying table shows the relative frequency with which the usual symptoms mentioned in the text-books have occurred in each group, and the leading points may be briefly summarized.

In the 17 cases of temporo-sphenoidal abscess, intense headache was present in all, vomiting in 13, drowsiness deepening to coma in 10, optic neuritis in 5.

In the 9 uncomplicated cases, temperature and pulse were subnormal in 2, in the cases with meningitis the rate was much above normal, and in the 2 cases with cerebellar abscess subnormal.

	Cerebral Abscess. 9 cases.	Cerebral Abscess with Meningitis. 6 cases.	Cerebral Abscess with Cerebellar Abscess. 2 cases.	Cerebellar Abscess. 10 cases.	Cerebellar Abscess with Meningitis. 5 cases.	Cerebellar Abscess with Sinus Thrombosis. 6 cases.	Sinus Thrombosis. 1 case.	Sinus Thrombosis with Pneumonia. 9 cases.	Sinus Thrombosis with Meningitis. 10 cases.	Meningitis. 33 cases.
Headache.....	9	6	2	9	5	5		3	4	21
Vertigo.....	1	1		2		3				2
Vomiting.....	7	4	2	5	5	3		3	6	12
Slow cerebration.....	5		1	2	1					
Drowsiness or coma.....	6	3	1	6	1	4				9
Constipation.....	2	4		2	1	1				
Subnormal temperature...	2	1	2	2		1				
High temperature.....		5			4	3	1	9	10	29
Remittent temperature....					1		1	9	10	29
Slow pulse.....	2	1	2	2		1				
Rapid pulse.....		5					1	9	8	15
Slow respirations.....	2	1	2			1				
Rapid respirations.....								9		
Optic neuritis.....	5			2		1		2	3	8
Pupil dilated on side of lesion.....	1									
Pupils unequal.....						1				3
Paralysis of limbs on side of lesion										
Paralysis of limbs on opposite side.....	1	1								2
Deviation of eyes to lesion		1								2
Deviation of eyes from lesion										3
Strabismus.....		1							1	1
Nystagmus.....				2		1			1	
Knee jerks absent.....	3	1				2				3
Knee jerks increased										2
Retraction of neck.....				1		1			1	4
Muscular twitchings or contractions.....					5				7	12
General convulsions.....		1		1	4				10	
Delirium and mental excitement		5			5	1	1		7	7
Rigors.....						2	1	8	5	1
Tenderness over jugular ..							1		1	
Age under 10.....			1	1	1	1		3	4	16
between 10 and 20 ...	4	4	1	3	3	3	1	6	1	5
between 20 and 40 ...	4	2		5	1	2			5	7
over 40.....	1			1						5

In the 6 cases with meningitis, delirium, restlessness, etc., were present.

In only 1 case, and that one of the uncomplicated ones, was the pupil on the affected side dilated and fixed.

In 4 of the 22 cases, the patellar reflexes could not be elicited. Sudden death occurred in 2 of the uncomplicated cases. In *no* case was an acute mastoid abscess present.

One of the cases with meningitis had rigors and developed a septic broncho-pneumonia.

Among the 21 cases of cerebellar abscess, headache was present in 19, vertigo in 5, vomiting in 13, drowsiness in 11, optic neuritis in 3, subnormal temperature and slow pulse in 3 only, constipation in 4.

Rigors occurred twice in the cases with meningitis and twice in those with lateral sinus thrombosis.

In the group with meningitis, delirium, restlessness, with muscular twitchings, were a conspicuous feature.

Sudden death occurred in 4 of the 10 uncomplicated cases, and in 1 other respiration ceased during the operation and although the heart was kept going for several hours spontaneous breathing was never re-established.

In 10 of the 21 cases, an external mastoid abscess was present.

Pupils were unequal in 1, nystagmus present in 3. The patellar reflexes never exaggerated, in 2 cases not obtainable.

Of the 20 cases of sigmoid sinus thrombosis rigors were present in 14, high and often remittent temperature in all, headache in 7.

Optic neuritis in 5, vomiting in 9.

Of the 33 cases of meningitis, headache was present in 21, vomiting in 12, mental excitement and delirium in 16, drowsiness in 9. Muscular twitchings in 12, convulsions in 10, pupils dilated in 2, unequal in 3, optic neuritis in 8, elevated and fluctuating temperature in 21. Increased patellar reflex in 2, absent in 3; conjugate deviation of the eyes from the affected side in 3, towards the affected side in 2. External mastoid abscess was present in 17.

The absence of the classical symptoms is a striking feature of these cases; this was not due to an omission

to note symptoms; in nearly all the cases definite mention has been made when symptoms of intracranial complications might have been expected, but were absent.

Headache was almost uniformly present in those cases where a brain abscess was present.

Vomiting was very frequently noted, but was absent in half the cases of uncomplicated cerebellar abscess.

Drowsiness or coma was about equally frequent in cerebral and cerebellar abscess.

Optic neuritis was more frequently observed in cerebral than in cerebellar abscess, and was rather remarkably common in the cases of meningitis, being present in 8 out of 33.

Subnormal temperature and slow pulse were comparatively infrequent, being found in only 8 cases of abscess out of 38.

Infection of the sigmoid sinus and meningitis were almost invariably associated with high temperature, and in the former group the usual remittent temperature was found in all but 2 cases.

The condition of the pupils was rarely an aid to diagnosis; in only one case of temporo-sphenoidal abscess was the typical dilated pupil on the side of the lesion present. Conjugate deviation of the eyes was not present in any of the cases of cerebellar abscess, although found in 1 case of cerebral abscess, with meningitis, and in 5 cases of simple meningitis.

Nystagmus occurred in 3 cases of cerebellar abscess. The patellar reflexes were absent in 4 cases of cerebral abscess and in 2 of cerebellar.

Delirium, muscular twitchings, contractions, or convulsions were almost uniformly present in all the cases where meningitis caused death.

Rigors occurred in 16 out of the 26 cases of thrombosis of the sigmoid sinus, but were never observed in any uncomplicated case of cerebral or cerebellar abscess, and in only 1 case of meningitis.

There was an antecedent history of chronic otorrhœa in 21 out of the 33 cases of meningitis; in 17 out of the 20

cases of sinus thrombosis; in 20 out of 21 cases of cerebellar abscess; in 13 out of the 15 cases of cerebral abscess, and in 1 of the 2 cases of combined cerebral and cerebellar abscess.

The average age of the cases of sinus thrombosis was 15, 7 being under 10.

The average age of the cases of meningitis was almost 17; 16 cases, nearly half, being under 10.

The average age of the cases of cerebellar abscess was 20; 3 being under 10.

The average age of the cases of cerebral abscess was 23, only 1 being under 10, and that was a case of combined cerebral and cerebellar abscess.

It is a feature of some interest that external mastoid signs were never observed in association with temporo-sphenoidal abscess, but occurred in about half the cases where cerebellar abscess or meningitis caused death.

Examinations of the cerebro-spinal fluid obtained through a lumbar puncture, and of the blood, were made in a number of instances, but were never found to be of diagnostic significance in the early stages of those cases where the diagnosis was uncertain.

Positive indications were only obtained when the diagnosis was beyond doubt.

A CASE OF HYSTERICAL MASTOID TENDERNESS AND PAIN, WITHOUT FUNCTIONAL DISTURBANCE.

BY H. GLOVER LANGWORTHY, M.D., DUBUQUE, IOWA,
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A young girl, D. E., fourteen years of age, was admitted to the Massachusetts Charitable Eye and Ear Infirmary, service of Dr. Edward M. Plummer, on September 23, 1905.

Family History.—Mother had always been "very nervous."

Past History.—One year ago said to have had a severe attack of pain and slight swelling over the right mastoid, which has persisted up to the present time. Pain worse "by spells." Tonsils reported having been removed in March, 1905. Patient felt slightly better until July, when the pain again returned with renewed severity.

Present History.—Says she has had headaches the past ten days, with intermittent tinnitus. Complains of pain in and radiating from the right mastoid, and thinks she has some trouble inside the ear. Nausea one day, no vomiting. Has "dizziness about the head," experienced on stooping. Taken into the hospital for observation.

Physical Examination.—Poorly developed and nourished. Stoops considerably. Pale, not anæmic. Watches one rather excitedly during the examination.

Right Ear: Membrana tympani very slightly retracted, rather thin; otherwise normal. Outline of malleus and incudo-stapedial joint easily seen. Canal walls normal. Mastoid process rather prominent. The entire, sharply defined area over the right mastoid is very tender and painful; does not follow distribution of any particular nerves. No œdema. Skin found

"peeling" and a little reddened from a weak solution of tr. iodine applied several days before.

Left Ear: Membrana tympani normal; mastoid process prominent like its fellow on opposite side. No mastoid tenderness.

Functional tests: whispered voice, Rinne, Weber, Galton whistle, and tuning-forks normal in both ears.

No neck tenderness. Teeth carefully examined, and found in excellent condition. Teeth had also been examined by a dentist a short time before. A thorough examination of all other organs was negative. No vaginal.

September 27th.—The skin over the right mastoid is normal in appearance, no œdema. Right mastoid process very tender, the slightest touch causing not only signs of distress, but a violent attempt to jerk the hands away. Still complains of radiating pain over the mastoid. Middle ear normal. Quantitative and qualitative tests normal. No dizziness. Cried in the dressing-room this morning from no apparent cause. Declares her ear is very painful.

September 30th.—Patient seen by Dr. G. A. Waterman, a nerve specialist, who finds: "Very slight nystagmus, area over the right mastoid hyperæsthetic—very slight spasm of the right sterno-cleido-mastoid muscle. No stigmata of hysteria present, although this does not eliminate the possibility of psychic pain. Suggestive treatment advised."

Temperature after the visit was 100° F. for the first time. Middle ear and tests normal.

October 10th.—The girl has been given electrical treatment every day at the Nerve Out-Patient Department of the Massachusetts General Hospital and suggestive treatment. Thinks the mastoid is less tender, but not quite sure of this. Still jumps if a motion is made to feel the part. Potassium iodide gr. xv. t.i.d. and strengthening diet prescribed. Treatment consisted essentially in psychotherapy.

October 23d.—Pain and mastoid tenderness have entirely disappeared for several days. Says she is well again, and looks much brighter. Middle ear and hearing test normal. Discharged from the hospital well.

The interesting features of this case are:

Hyperæsthesia of a considerable degree and unilateral mastoid pain. Contrary to most of the reported cases of

this character, the functional tests were all normal, the hearing not having been affected at any time to the slightest extent. The slight spasmodic contracture of the sterno-mastoid muscle (tonic) is in perfect accord with the condition.

The mastoid trouble seems to me analogous to the so-called "hysterical joint," namely, sensitiveness without swelling.

The diagnosis from the predominance of subjective over objective symptoms, the presence of a very slight contracture, and the history of nervousness, as well as antecedents, seem clear.

Prognosis must surely be somewhat uncertain. A relapse under the influence of another exciting cause would not be surprising.

PRIMARY CAVERNOUS SINUS THROMBOSIS SECONDARY TO OSTEOMYELITIS OF THE PETROUS PYRAMID.

By ARNOLD KNAPP, M.D.

(With one illustration on Text-Plate IV.)

F. B., Italian, aged thirty. Suffers from diabetes and ozena. On October 18, 1905, the left ear began to pain. He applied for treatment at the New York Ophthalmic and Aural Institute. Paracentesis was performed, discharge set in, and he was somewhat relieved. The incision of drum was repeated after a week; he then stayed away from the hospital. On November 15th the discharge ceased; he suffered from severe headache in the right half of the head, for which he received treatment by his physician at his home until the right eye began to protrude. On November 22d he was admitted to the hospital.

On Admission.—Pale, rather emaciated man, of medium size. Temperature, 99° F.; pulse, 80; respiration, 18. Complaints of very severe pain in right half of head, especially in eye.

The right eye is very prominent, the protrusion being straight forward in line with the orbital axis; motility equally restricted. Pupil reacts. $V = \frac{2}{7} 0$; F. n. Fundus neg. No tenderness over frontal sinus. Left eye is normal.

Right Ear: Canal dry. The drum is thickened and red; apparently no bulging. No details visible. No tenderness over mastoid process. $H = (\text{watch}) \frac{3}{10} 4$. Left ear normal.

The nose and throat present the pronounced features of an atrophic process with scabs.

Urine contains large quantity of glucose. The patient is perfectly conscious and rational.

November 23d.—Moaned and complained of right eye, ear,

and throat ; vomited during night. The eye is more protruding. Throat shows a membranous exudate on tonsils. Complaints of headache. In evening became very restless and excited. Leucocyte count, 25,000. A.M.: temperature, 99° F.; pulse, 84. P.M.: temperature, 101° ; pulse, 79.

November 24th.—Very severe pain in attacks localized to right half of head. Seems dazed and stuporous. At 5 P.M. the left eye is protruding. The exophthalmos right is more marked, with chemosis of conjunctiva. Right optic disc shows venous congestion. Left normal. Pain over temporal region. There seems to be trouble with the throat ; he is continually expectorating and clearing throat. Paracentesis performed. Pus escaped. This contained diplococci in capsules. General condition is not so good ; he is delirious at times. Takes nourishment well. A.M.: temperature, 102° ; pulse, 80. P.M.: temperature, 103° ; pulse, 96.

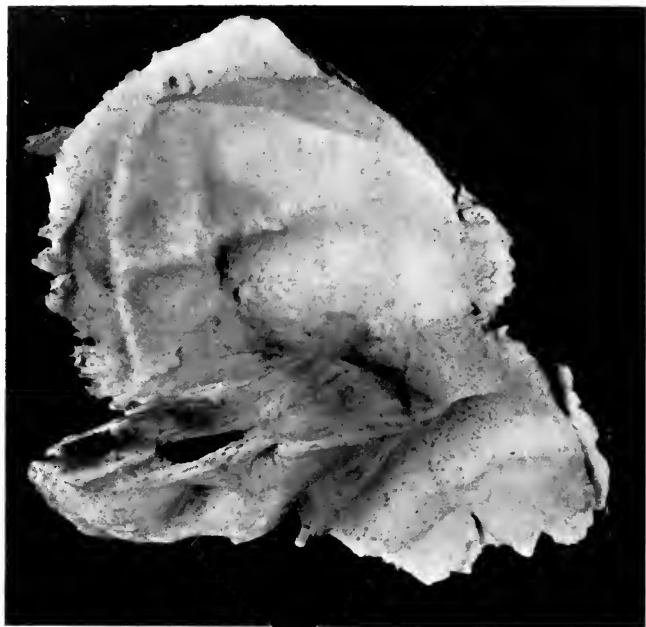
November 25th.—Restless and stuporous. Right ear discharges profusely. Left eye more protruding. Both eyes painful. Headache. Delirious. Chokes on swallowing ; coughs, and fluids regurgitate. During night, attack of great weakness which requires stimulation. A.M.: temperature, 101° ; pulse, 101. P.M.: temperature, 101.8° ; pulse, 94.

November 26th.—Worse. Left eye more protruding. Right apparently less. Some twitching of head and limbs. Involuntary urination. Profuse otorrhœa. Difficulty in swallowing. Pulse perceptibly weaker. A.M.: temperature, 102° ; pulse, 100. P.M.: temperature, 103° ; pulse, 103.

November 27th.—Condition gradually failing. Coma. Temperature, 106° , and died 12 M.

Autopsy.—5 P.M., November 27th. Dura unusually adherent to skull. Surface of brain normal ; some œdema of pia. Blood-vessels in right Sylvian fissure thrombosed and purulent. On lifting up the brain, base normal ; anterior extremity of right cerebellar lobe showed some purulent exudate. Right lateral sinus contains post-mortem clot. In the right sigmoid sinus there is a disintegrated but recent clot, becoming purulent as it approaches the bulb. Superior petrosal sinus normal. Dura over right cavernous sinus bulging and yellow ; on opening this a cavity filled with thick, creamy pus is exposed. The left cavernous sinus also contained pus. Sphenoidal sinuses healthy. After removing dura from surface of petrous pyramid, a round, cari-

ILLUSTRATING DR. ARNOLD KNAPP'S CASE OF PRIMARY CAVERNOUS
SINUS THROMBOSIS.



The dark areas show the site of the carious defects at the apex of the petrous pyramid.

ous defect, 1 cm in diameter, in the bone is found at apex just underneath the Gasserian ganglion (see illustration), anterior and internal to internal auditory meatus. The meatus and its contents appear healthy. Another defect is found along the superior petrous margin somewhat externally (see illustration), but communicating with the cavity at the apex of petrous pyramid. The temporal bone is divided by sections in the plane of the petrous pyramid. The tympanum is filled with swollen mucous membrane. There is no fistula on inner wall. The antrum is small and completely filled with swollen granulations. The mastoid process is entirely infiltrated, though no actual cavities or disintegration can be observed. The infiltration extends inward from the antrum just above the external semicircular canal throughout the cancellous tissue and communicates with the carious areas near the petrous apex described above.

Remarks.—The middle ear and antrum were originally infected from the nose. The rapid and extensive involvement of the temporal bone is explained by the diabetic condition of the patient, which, moreover, contra-indicated any operation. The anatomic peculiarity of an unusually thickened mastoid cortex aided in the extension inward of the morbid process, and accounts for the lack of external mastoid symptoms. The post-mortem examination of the temporal bone revealed an osteomyelitis of the petrous pyramid, without any distinct pus, but with the presence of granulations and disintegration of bone. This extended directly inward above the external semicircular canal to the defects in the bone along the superior petrous margin and 'at the Gasserian fossa (see illustration). The process presumably reached the Gasserian ganglion at a period coincident with the intense neuralgic pain from which the patient suffered. The distance then to the cavernous sinus is a short one.

In the ARCHIVES OF OTOTOLOGY, vol. xxxi., p. 321, an article appeared on the "Involvement of the Gasserian Ganglion in Middle-Ear Suppuration," by Dr. R. Hilgermann of Breslau. In it, it is stated that the well-known path of extension is found in the pneumatic cavities of the petrous bone; these cavities, though usually only found in

the mastoid process, may extend throughout the entire pyramid. The extension may occur through some cells situated anteriorly near the tympanic ostium of the Eustachian tube. The pneumatic cells directly inward of the hypotympanic space may be involved, or infection may travel by the carotid plexus of veins surrounding the carotid artery.

In our case the internal auditory meatus was macroscopically normal, there were no previous clinical signs of labyrinth involvement, and hearing was not extinguished. The purulent thrombosis of the cavernous sinus was secondary to the osteomyelitic focus at the petrous apex (*impressio trigemini*). The condition then extended to the cavernous sinus of the other side, causing exophthalmos, and backward to the jugular bulb and sigmoid sinus of the same side. These were unquestionably secondary, from their appearance at autopsy.

Cavernous sinus thrombosis is usually secondary to sigmoid sinus thrombosis, or affection of the ophthalmic veins. In ear disease it occurs in one of three ways. First: Sigmoid sinus thrombosis through intermediary of the petrosal sinuses. Second: Carotid plexus of veins surrounding the carotid artery by infection from the tympanic cavity. Third: Involvement of the petrous cancellous cells, either from the cells on the inner wall of the tympanum or from mastoid antrum, as in this case. The involvement of the cavernous sinus presented some interesting features. The extension to the cavernous sinus of the other side is usual, and the subsidence of the exophthalmos on the first affected side has been frequently noted, and is due, according to Macewen, to establishment of the collateral circulation.

Symptoms of pyæmia were absent, and meningitis, the usual outcome, did not come to recognizable development. The interference with the orbital circulation should show itself, as one would think, in the eye-ground. In our case, however, there was no change, which agrees with Jansen's experience (*Encyclopedie d. Ohrenhkl.*, p. 369).

THE NATURE OF OTOSCLEROSIS IN THE LIGHT OF HEREDITY.

By O. KOERNER, ROSTOCK.

Translated from *Zeitschr. f. Ohrenheilk.*, Vol. L., 1905, German Edition of
these ARCHIVES.

IT is an old matter of experience that progressive deafness occurs in several successive generations of a family. The first person to draw attention to this heredity was von Troeltsch. He believed that in deaf families peculiarities in the structure of the skull were inherited which favored the onset of the so-called chronic simple ear catarrh. These peculiarities consisted in: (1) a congenital narrowing of the naso-pharynx and tubes which induced chronic catarrhs of the pharynx and tubes resulting in tubal occlusion; (2) a peculiar structure of the labyrinth windows and their surroundings and a shallowness of the tympanum which represented favorable conditions for the development of adhesions.

This assumption is correct to a certain degree as regards tubal catarrhs and adhesive processes in the tympanum. It does not, however, explain the heredity of that process which to-day we designate as otosclerosis and separate from the collective term "chronic simple aural catarrh" of von Troeltsch. This process, which occurs principally in the bone surrounding the labyrinth, invading the tympanum only near the labyrinth wall and its windows, cannot be the result of unfavorable conditions in the pharynx, in the tubes or in the tympanum, and it is, according to our present knowledge, the only condition which leads to inherited progressive deafness. Some authors, including Politzer, are even inclined to

regard the hereditary tendency to otosclerosis as of importance in differential diagnosis against the adhesive process.

This would suffice to explain the necessity of examining the hereditary characteristics of otosclerosis more thoroughly than has been done thus far. The hereditary feature has been regarded indifferently, rather as a curiosity. Little did we expect that biology would develop a theory of heredity which is capable of explaining the much-discussed nature of otosclerosis.

We must first state what is known of the method of inheritance of otosclerosis and then add what is new.

Though the heredity of otosclerosis has been generally accepted, we do not know how frequently it occurs. The statements of patients about the ear diseases of their immediate ancestors are incomplete and the physician is rarely in a position to examine all the members of the family of the patient and to obtain reliable information about the diseases of those who have died. It is therefore certain that the statements on the frequency of heredity mentioned in literature give too small figures. Thus among forty-two cases collected by Panse only three gave definite information about similar affections of other members of the family. Siebenmann, Denker, and Bezold found that among their patients 35%, 40.5%, and 52% gave a hereditary history. Even these figures, which do not, of course, include an aural examination of all the living members of the families of the patients, are much too small. We shall see later on that every case of otosclerosis is inherited.

Of considerable importance for the determining of this question is the formation of family trees of those suffering from otosclerosis. In literature I have only been able to find two family trees in an interesting communication of Hammerschlag's. I add three similar trees from my own observations, which together, I think, furnish some interesting deductions.

My family trees show the hereditary tendencies to otosclerosis in families which I have been able to follow for years and in whom I have examined most of the members. The other members who were deaf presumably also suffered from

otosclerosis, for in some who had died the diagnosis was made by aurists, and in the cultivated families the characteristics of this disease were also noticed by the laymen, namely, the progressive course, the tinnitus in the beginning, the onset or aggravation during pregnancy, the absence of pain and suppuration.

In the five families there were eight, eight, three, eight, and sixteen, altogether forty-three cases of otosclerosis. Of these seventeen were males and twenty-six females. Without apparent heredity the otosclerosis appeared in seven; seventeen became affected in the second generation; twelve became affected in the third generation, though in my cases, at least, the ages of the patients showed them to be too young to become affected; seven became affected in the fourth generation.

The inheritance in the youngest generation of this last family occurred from parents both of whom suffered from otosclerosis and were consanguineous. The transmission occurred to all the seven children. Otherwise, one of the parents transmitted the condition to the children, from the father ten times, from the mother eighteen times, from the father and mother seven times.

The inheritance occurred from father to son five times, from father to daughter five times, from mother to son nine times, from mother to daughter nine times, from father and mother to son twice, from father and mother to daughter five times.

Of the children who were predisposed to otosclerosis through heredity, thirteen were first-born, six were second-born, seven were third-born, five were fourth-born, two were fifth-born, two were sixth-born, three were seventh-born, two were eighth-born, one was ninth-born.

How can we explain the nature of otosclerosis from these hereditary conditions? Before answering this question it is necessary to briefly give the laws of biological heredity and their importance for pathology. These are taken from the illuminating remarks of Martius, Professor of Medicine in Rostock.

The children inherit, or the parents transmit, only those

peculiarities or their material substrata which are contained as rudiments in the germ plasma of the parental sexual cells. The union of the ovum and the sperm cell completes the act of inheritance. The inherited material substrata of the parental germ cells are called determinants, according to Weissmann. The unusual number of determinants do not alone originate in the plasma of the parents but from the collected ancestral plasma. They may be transmitted from one individual to the progeny without ever having become active in that individual or in part without ever having become later active. What is not contained in the determinants no external influence can add to the individual germ plasma which is complete after the germ union.

This has the following bearing on pathology.

The predisposition to disease may exist as a determinant and be heritable. A disease rudiment (disposition) and an external (exogenic) cause as an infection may produce disease, but this acquired disease cannot be transmitted to progeny with the germ cells. In other words, it is not heritable. It is, therefore, incorrect to speak of hereditary diseases. The term hereditary syphilis is incorrect. It is usually congenital because it is transmitted from the mother to the fœtus through the placental circulation.

That diseases cannot be inherited is evident if we realize that they do not represent conditions or peculiarities, but events which are of no significance for the formation of the individual. These events can naturally not be contained in the germ plasma. It would seem that hemophilia is a disease which would negative the correctness of this theory, but hemophilia is no occurrence—in other words, no disease, but it consists in a peculiarity of the blood which was given by a determinant, and is therefore heritable, the characteristic of the blood being that it has lost its tendency to coagulate. From this inherited individual defect hemophilia occurs if, through some external process like injury, conditions are furnished which present the insufficient coagulability of the blood.

Let us now return to otosclerosis.

As diseases cannot be inherited, and as otosclerosis is

inherited, it would seem that it is no disease, at least not in the above exact and scientific sense. Otosclerosis would be a disease and a congenital one, but not a hereditary one if it were of syphilitic origin as Habermann assumes. The following are the reasons for this assumption of Habermann's:

Among thirty cases of otosclerosis the etiology seemed certain in four, almost certain in one. In the other cases syphilis could not be excluded with certainty.

To this may be replied, that the syphilitic origin of sclerosis has not been demonstrated in a single case of Habermann's thirty cases, because the onset of sclerosis in a syphilitic person does not show any causal relation of the two diseases, but only a coincidence which may be accidental. If syphilis was present in only four or five out of thirty, then, given the frequency of syphilis and the rarity of otosclerosis, it would seem that otosclerosis cannot be syphilitic. That syphilis was the cause in the remaining twenty-six cases may, of course, be correct. If Habermann assumes that syphilis is the cause, to prove his hypothesis he must therefore prove that every sickness is syphilitic.

A further proof offered by Habermann is that otosclerosis occurs generally between the ages of twenty and forty to fifty years, a period in which syphilis is most frequently acquired. It may also be mentioned that carcinoma occurs most frequently at this age without stating that it is of syphilitic origin. I doubt very much the correctness of this age for the most frequent onset of otosclerosis. It is quite true that most of those suffering from otosclerosis seek aid in those years, but E. Hartmann years ago has shown that the onset of this extremely insidious trouble probably occurs at a much earlier age. In reality an early onset of otosclerosis is not rare, for in the three families which I have observed in the last generation one was affected at the age of ten, one at fifteen, and the other three before the twentieth year. In literature early examples of this disease have been mentioned by Bezold and Scheibe.

Furthermore, the statement of Habermann is not convincing, that the kind of changes in the bone found in oto-

sclerosis are syphilitic in character. Finally the question can be decided from the clinical side, to which we now turn.

Here we find a number of features which argue against syphilis. If we examine the family trees we are immediately struck with the large number of children these deaf people have had—namely, four times 10, once 9, three times 7, four times 5, three times 4 and 3, twice 2, and only once 1—on an average 5.5. My second deaf family shows an unusual longevity, and infant mortality plays no rôle in these families, and deaths in the first months have not occurred. These are, of course, all opposed to the conditions found in syphilitic families. On examination of the deaf patients and of the other members of their families, I have observed only one case of tabes and sclerosis, who had had ten healthy children.

Siebenmann also opposes Habermann's hypothesis. He has had the family histories of the various cases of sclerosis which he has examined carefully gone over without finding any trace of syphilis.

If, therefore, sclerosis is not a disease, in the truly scientific meaning of the word, how are we else to regard it? The answer is furnished by the interesting pathological investigations of Siebenmann.

We call otosclerosis that form of progressive deafness which pathologically rests upon a hyperostotic new formation of bone in the labyrinth windows, thus fixing the stapes in the oval window, and the rarefaction of the otherwise compact labyrinth capsule. Though many authors believe that these changes are derived from an ossifying periostitis following an infection of the mucous membrane in the tympanum, Siebenmann concludes that this is incorrect, and that the oldest parts of the process are to be found at the periphery of the primary labyrinth capsule, and the connective tissue bone secondarily developed from the periosteum. He regards the rarefaction in the last phase as a developmental process, which normally does not occur in the petrous bone, but is the rule in other bones, and consists in a complete disturbance of the cartilage situated in the inter-

globular space and in the window margins, and the transformation of the compact bone into osteoid tissue and finally into spongiosa.

This interpretation of Siebenmann's of otosclerosis as an abnormal post-embryonal development proves the fact of its hereditary nature. Every stage of growth, whether normal or abnormal, must be furnished in a determinant transmitted from the ancestral plasma of the individual, and is therefore heritable. Whether the determinants become active may in our cases depend upon certain influences of an internal or external nature. Clinically, we have seen that the onset of puberty, which is probably the greatest incentive to bony growth, and the childbed, which also causes changes in the bony system, may be regarded as exciting causes. In rare cases a disease of the tympanic mucous membrane may have some influence in causing the abnormal development.

How can we explain the cases of otosclerosis in which there is no heredity? Our law of inheritance again helps us out.

The normal determinants which preserve the species are constantly transmitted. If this did not take place man would have degenerated long ago, or even have disappeared from the earth. The determinants which represent individual characteristics are different. These are inherited, but do not become active in each successive generation, but may skip a child, and then again appear in a grandchild. Thus the grandchildren frequently resemble their grandparents more than they do their parents. The determinants in these cases have remained inactive for several series of generations, then suddenly recur to activity. This is spoken of as latent inheritance.

We must also remember the many determinants which are collected in the ancestral plasma of each individual. In twelve generations we have 4096 forefathers, if we disregard the loss of ancestors through consanguineous marriages. If we therefore assume that the otosclerosis determinant must be present in the ancestral plasma of each person, after generations it may suddenly become active and destroy the happiness of an entire family.

The apparently spontaneous causes of otosclerosis can therefore easily be expressed by latent inheritance. It would, of course, be difficult in these cases to discover the determinants, because the ancestral trees can be followed in most persons to hardly three generations.

The law of inheritance explains the character of otosclerosis as an inherited abnormal process of development. When and how it occurred in our ancestral plasma is, of course, not known. The presence of heredity, as *Hammer-schlag* has correctly said, simply pushes the question back to the original cause, which is unfortunately at an infinite distance.

Though the light which the theory of inheritance throws upon the nature of otosclerosis is slight, we nevertheless receive more information as regards the prophylaxis and treatment of progressive deafness. When the determinant of the abnormal development has become active, every hope of successfully combating this affection must be regarded as futile. The prophylaxis is somewhat more encouraging. We may accomplish something by advising the person who is suffering from otosclerosis not to marry so that he will carry with him to the grave his determinants. In the female descendants of one suffering from otosclerosis who are not deaf, the advice not to marry is especially important, because every pregnancy is apt to incite the latent determinant into action. Conscientious physicians have followed this course on the basis of experience. We may now give this advice with greater emphasis because it rests upon a biological law.

THE THEORY OF SOUND-CONDUCTION.

BY DR. GEORG BOENNINGHAUS, BRESLAU.

Translated by Dr. ARNOLD KNAPP from *Zeitschr. f. Ohrenhkl.*, Vol. XLIX.,
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IT is now about a year since I published my attempt to explain the theory of sound-conduction by a new method, namely, by means of comparative anatomy, and selected the ear of the whale as being most suited for this purpose. Numerous criticisms have appeared. Some of these consist simply of reviews, others are expressions of opinion in meetings, but it is especially the paper of Bezold, in the first and second numbers of the forty-eighth volume of this *Zeitschrift*, on "Further Investigations on Bone-Conduction," etc., which has induced me to publish the following:

I.

The only review which is at all critical is that of Eschweiler in vol. xlvii., No. 1, of this *Zeitschrift*. This writer believes that I have passed over certain objections too quickly. The objections, however, are not mentioned, so that I can only reply that my conclusions coincide with the standpoint of our physical knowledge on sound and sound-conduction, and support the physiological and clinical aspect of sound-conduction in the ear in a most objective and critical manner.

This writer also accuses me of thinking in too teleologic a manner in the department of comparative anatomy and phylogensis, but in this I cannot agree with him. In my opinion he believes that I depend upon the standpoint taught by Kant and developed by Darwin for the organic world, that

things may be explained by a mechanical cause originating from the causal necessity which Darwin represents as the struggle for existence, but that in this struggle, expressed generally, the necessary members are preserved and correspondingly changed for their purpose, but the unnecessary ones, however, are lost. This form of teleologic reasoning is entirely justified, and represents the guiding star for thousands of workers in this field of biologic research. I surely have not gone too far as regards the main facts. The principal idea of my paper is as follows: The whale is a mammal which was originally possessed of organs, such as legs and hair, which serve for life on land—in other words, one of the original land mammals,—and which then, as has generally been accepted, in the struggle for existence, on account of the pressure of lack of food, variations in temperature, or from attack, abandoned life on the land and adopted continuous residence in water. Then the organs which are unnecessary for life in the water, as the hair, the posterior extremities, and, of the nerves, the olfactory, were lost. The useful ones, however, were preserved as far as it was necessary, and were modified to adapt them for their new environment. Thus the eye has been changed and has become a fish eye, and the ear has been modified. The purpose of the Kent-Darwin teleology is to determine to what degree this transformation of the ear is adapted for its new surroundings. The conclusions which I endeavor to draw from the simple conditions in the whale to explain the more complicated conditions in the land mammals and in man, which of course represent the true worth of the paper for human physiology and for otology, are no longer teleologic, but are simply logical deductions.

II.

The point about which the entire theory of sound-conduction rotates, according to my idea, is the question whether the vibrations of the basilar fibres, which, according to Helmholtz's theory, are regarded as the adequate irritants of the auditory nerve terminals, are set in motion by the movements of the water column in the labyrinth in a mechanical

manner (mass movement), or by means of molecular waves which traverse the labyrinth water, and by addition of this molecular impulse are set in vibration just as tense strings co-vibrate (molecular movement). These two possibilities must be considered, because, by the impulse of the plate of the stapes in the labyrinth, not only mass movements of its water take place in the given sense, but also molecular movements are produced, according to the kind of sound waves. If one favors the mass movement, the old theory, then the entire knowledge of sound-conduction, including the function of the tympanic muscles and the prolongation of bone-conduction in disturbances of sound-conduction, remains an unsolved and improbable riddle. If the molecular movement be adopted, we then have a guide which alone will conduct us through this chaos without incurring any improbabilities or contradictions.

It must first be taken for granted that the distinction between molecular movement and mass movement, as was first suggested by Müller, should be thoroughly understood. It must also be accepted that one of these forms of motion can be transformed into the other. These two premises do not hold for medical men in general because of their slight education in physics. The frequent transition of mass movements into molecular movements, and *vice versa*, can be illustrated by ordinary events of the daily life. The blow of a hammer against a stone converts the mass movement of the hammer to sound, heat, and light. The mass movement is then entirely lost if the stone remains stationary. It is, however, in part lost and in part transmitted to the stone if the latter is not fixed. In our modern electric-power appliances, mass movements are converted into electricity, electricity then into light, or again into mass movements. A window pane which is not firmly fastened, a tuning-fork, a tense string, will be converted by a suitable tone into movements, vibrations, resonance—the conversion of sound into mass movements. Tense membranes, telephone plates, phonograph plates, vibrate to all sounds. The drum does this in the most complete manner, even to whisper. String instruments, drums, tuning-forks, when

struck, produce sound-transmission of mass movements into molecular movements. If the medium which surrounds the source of sound is movable, then the mass movements will be transmitted to the surrounding media. If I hold a vibrating tuning-fork so that one blade is in water, sound is produced which can be heard in the water, and, in addition, the water in its immediate neighborhood is transformed into distinct mass movements. If the vibrating drum forces the stapes which has been set in motion into the labyrinth water, then the displaced labyrinth water must receive a twofold movement, a mass movement consisting in a motion of the water column between the stapes and the round window, and a molecular movement which is similar to the molecular movement of sound.

III.

My view that the basilar fibres are caused to vibrate by molecular motion rests upon the fact that the labyrinth of the whale, this water mammal which constantly swims with its ear under water, hears everything well which occurs in the water about it when it is acted upon by the molecular movement. The reason for this is that the stapes of the whale is so firm in the oval window that the necessary force which would be required to make it move in the direction of the labyrinth cavity is inconceivable. The stapes is consequently physiologically immobile. Bezold, however, is of a different opinion. I shall endeavor to ascertain which opinion seems the more probable. To show that the stapes of the whale is movable and consequently that the vibrations of the basilar fibres in the whale just as in the land mammals are set in motion by mass movements, Bezold advances the following reasons: We both regard the attachment of the processus folii of the hammer to the tympanicum of the whale as bony and therefore immobile. We may therefore disregard the mass movement of the hammer and the drum as agents in moving the stapes. Bezold, however, assumes that a moderate degree of mobility exists in the synchondrosis between the hammer and the incus, the incus and the stapes,

and the stapes and the oval window. This has not been proven by Bezold, and I have not been able to detect the slightest degree of mobility under a magnifying-glass if I pressed with a needle against the ossicular chain. The possibility of movement, according to Bezold, in these joints exists because the connection is a cartilaginous one, but this junction, to my mind, may be even firmer than the bone itself, for in one species of whale if one presses on the head of the hammer or the body of the incus of this animal then the line of fracture is not the hammer, incus, the malleo-incudal articulation, but rather the processus folii and the synchrondrosis between the incus and the stapes. This is, however, not so important because in the physiological action of the stapes the force acts not in a transverse but in a longitudinal direction. If we exert a pressure in this direction with a needle on the head of the stapes no movement of the labyrinth water can be detected, which is, of course, the opposite of the conditions in the land mammals. The immobility of the stapes is caused by cartilage which attaches its unyielding flat foot-plate to the margin of the round window and also because its posterior margin rests upon a peculiar bony projection of the labyrinth vestibule. This synchrondrosis of the stapes and foot-plate is so firm that even in a macerated specimen the stapes can only be removed out of its window by considerable effort. Is it probable that the sound waves of the water can cause mass movements in the stapes of the whale that thereby produce vibrations of the basilar fibres? Bezold believes that this is possible because the sound waves in the water cause the head of the whale to co-vibrate so that the stapes must also move. We have learned from the experiments of Müller for the fish-bladder, Dennert for the tuning-fork, and Kayser for the telephone plate, that bodies in water may be caused to co-vibrate by sound waves in the water. It seems to me very improbable, however, that such an enormous structure as the skull of a whale, which is in turn covered by fat almost a metre in thickness, can be so easily caused to vibrate. Notwithstanding the ready transmission of sound waves to solid bodies in water, this is to a certain extent equalized by the

increased resistance which the surrounding water exerts against vibration. This resistance is readily understood by the rapid dying out of tuning-forks in water. The intensity of sound, therefore, in water must be unusually great to be brought to perception in this manner in the case of the whale. Such might be the advancing roar of the beach, but if the whale was not able to hear anything but this, he would be very poorly off. He must be able to appreciate noises which emanate from smaller animals. These are the respiratory noises, the blowing of the tail, and the voice so far as this is present. In the absence of the sense of smell and touch which is so highly developed in the fishes, and the slight value of the eye in water on account of the slight degree of light, this alone makes it possible for them to find their own kind, and it seems probable that an extremely delicate hearing alone makes existence possible for the whale. This high development of the hearing is especially apparent from the remarkable acoustic isolation of its labyrinth. These reasons all lead me to believe that the basilar fibres can hardly be made to vibrate by mass movements of the labyrinth fluid.

Bezold further believes that the movements of the stapes are accentuated in the following manner: The tympanic bone in the whale is attached to the outer surface of the temporal bone. The vibrations of the stapes and of the incus cause the bones to feather just as the vibrating string of a musical instrument causes the resounding box to vibrate. The vibrations of the bony resonance box in the whale in turn increase the vibrations of the bony strings of the incus and stapes. The possibility of this feathering, however, seems to me very slight if one considers the enormous size of the tympanic and temporal bone in a whale. I must confess that the relatively thin tympanic bone of the phocæna, of the porpoise, and of the narwhale can be made to feather on heavy pressure with the finger. He also believes that this action of both bones is supported by the tensor tympani muscle, and believes this explains the persistence of this muscle, notwithstanding the mobilization of the hammer. This, however, can be explained by the fact that muscles, after they have once been developed, even if they have

lost their function do not need disappear. The muscles of the auricle in man are an example of this.

Bezold speaks of another form of sound-transmission in the whale. On striking various parts of the tympano-perioticum with a metal hammer, various tones were produced which embraced the larger part of the tone scale. The employment of this phenomenon to explain the theory of sound-conduction in the whale has, however, great difficulty and Bezold does not go into it very deeply. I consider this phenomenon as an incidental one and without importance.

Finally, Bezold observes in the shell-like form of the whale bulla an important organ for sound-conduction because each shell, like the sea-shells, possesses remarkably good resonance. The shell-shape bulla of the whale resulted from the fact that the margin of the tympanicum did not adhere to the perioticum, the purpose of which I believed to find in the resulting acoustic isolation to prevent an interference of the sound waves. A sea-shell only resounds if it is filled with air; if it is only partly filled with cotton, it no longer acts as a resonant. The whale bulla is filled with an unusually thick mucous membrane and a peculiar venous body, so that its resonance is made improbable.

Aside from these two last points, it is readily observed what enormous difficulties one encounters in endeavoring to explain the movements of the stapes by mass movements of the labyrinth fluid for the purpose of exciting the basilar fibres. The condition becomes simple and physically evident if we regard molecular passage of the labyrinth water in the whale as the exciting factor of the basilar fibres. In the whale the sound waves of the water are transmitted by molecular movement to the oval window by means of the immobile ossicles, which can be regarded physically as a sound-conducting rod with a large sound tunnel at one extremity.

Bezold opposes the probability of molecular conduction in the whale for the following reasons:

He thinks that the presence of cartilage in the ossicular chain in the whale does not facilitate molecular conduction of sound. It is quite true that every variation of density reduces the conducting power of a body, but this reduction

cannot be marked in the case of the whale because even in rods which are glued together the conduction remains good. The presence of cartilage at places which formerly were movable is explained by the descent of the whale from its progenitors, which were land dwellers. We find in the whale embryo articular fissures, and this again proves the old truth which Hackel has mentioned, that the embryology of an animal is a short recapitulation of its progenitors.

Bezold further states that if the sound-conduction to the labyrinth in the whale be regarded as molecular then the sound-conducting chain is entirely superfluous and its progressive development in a physical sense is incomprehensible. The broad communication of the tympanicum with the external surface of the perioticum suffices to transmit the sound to the labyrinth. I need simply mention again that it is not indifferent at which part the sound waves enter the labyrinth for the purpose of exciting the basilar fibres. The greatest excitation presupposes the entrance of sound waves to the labyrinth through the oval window.

Bezold does not lay any particular importance on the synchondrosis of the joints in the whale because the partial or even complete absence of articular fissures is also found in man. I should like to reply to this by stating that a synchondrosis alone is not the principal distinction between water and land mammals, but a synchondrosis which leads to immobility of the articular connections. A spring synchondrosis and an immobile synchondrosis, these are the principal physical differences, especially in the region of the oval window. The same condition is found at the processus folii. In the whale the processus folii is constantly adherent to the tympanicum. That, however, does not prevent the vibration of the hammer because the process is so thin and pliable that the hammer has almost the same degree of mobility as if it were not adherent to the processus folii. In the whale the adherent processus is, however, so thick that mobility of the hammer can be excluded.

This more or less finishes Bezold's criticisms. I have observed their appearance with great satisfaction because they recognize the importance of the whale ear for the study of

sound-conduction in general, and I trust that this same method will be followed by others. It will be extremely valuable if optical graphical methods, as have been applied in the mammalian ear by Politzer and others, are employed to study the vibrations of the sound-conducting apparatus of the whale-head in water when the sound is conducted through the water. For those who are desirous of studying this condition in the *Phocaena communis*, a small tooth-whale, I have obtained my material from Bernhard Nehls, Croslin in the Baltic. They are captured in April and cost four marks per head.

IV.

The supposition that the basilar membrane is caused to vibrate by molecular movements communicated to the labyrinth water by the stapes leads us to an explanation of the prolongation of bone-conduction in disturbances of sound-conduction. The following remarks supplement my paper to the Congress of German Otologists in Wiesbaden.

Two motions arise from the handle of a vibrating tuning-fork. The one is molecular motion, sound, audible when the handle of the fork is held in front of the ear. The other is mass movement, which is perceived by a concussion of the head. Not only the last but also the first passes through the head on account of its good conducting power by means of simple molecular conduction. Both motions must be transmitted to the sound-conducting apparatus, first, because the apparatus is unusually sensitive, and, secondly, because all media conduct sound more or less well. The sound-conducting apparatus is placed in motion by the mass movements in the same way as when it is set in motion from air. The stapes presses in the same manner upon the labyrinth water and causes a small molecular movement. The molecular movement which is transmitted by the bone when it arrives at the stapes plate continues in the direction from without inwards and gives the labyrinth water the same movement towards the basilar membrane as the molecular waves produce by the action of the stapes. These two motions are augmented by addition. In all middle-ear pro-

cesses, as Bezold has shown, the sound-conducting apparatus is immobile. The simple molecular transmission by means of the bone to the apparatus and to the stapes is therefore facilitated. The mass movement of the apparatus, however, is diminished. If under these conditions the tuning-fork is perceived longer from the bone than through air, this can only be the result of the improved transmission of molecular movement and not of diminished mass movement.

Thus Bezold's paper on bone-conduction forces me to make a modification in this description of the prolongation of bone-conduction, but the final result remains the same, that the prolongation of bone-conduction can only be explained by assumption of the molecular irritation of the basilar fibres.

Bezold is also of the opinion that from the handle of a vibrating tuning-fork two forms of motion are imparted to the bones of the skull. The mass movement causes the skull and, of course, the highly sensitive sound-conducting apparatus to vibrate. This can only be produced by molecular motion, for when it has passed the drum membrane it acts just as the sound-airwaves. The drum membrane and the ossicles are caused to vibrate in mass movement. This is surely correct, but the two impulses which cause the drum to move do not augment one another, but, to a certain extent, interfere, for, while the drum membrane receives the inclination to vibrate inwards by the molecular power, the concussion of the bone gives it an inclination to vibrate outwards. If these two impulses are the same, then the sound-conducting apparatus must stand still. But experiments have shown that the drum membrane is caused to vibrate by a tuning-fork placed upon the skull. One impulse must therefore preponderate. The motion of the drum produced from the skull must be smaller than the motion which the drum receives from the air, and so Bezold attempts to explain why sound-conduction is greater than bone-conduction in the normal ear.

This movement and contra-movement cannot be denied physically, though there is a second means of explaining the preponderance of sound-conduction. The auditory canal

may receive the sound waves from the handle of a fork held in its proximity, and conduct them to the drum membrane, while the vibrating fork placed on the bone can send a part only of its sound waves to the sound-conducting apparatus because there is no corresponding receiving tube.

From these ideas Bezold believes to have explained the prolongation of bone-conduction in middle-ear processes. I must, however, oppose this. Bezold believes that fixation of the sound-conducting apparatus is diminished by the contra-movements of the apparatus from concussion of the skull; the molecular movement, however, is not because by the fixation the molecular transmission of sound waves from the bone is augmented, so that it is clear that the vibrations of the apparatus are greater, and not less. Of the two impulses which are 'transmitted to the drum membrane as the cause of fixation, one remains equally strong, or may even be increased, while the other is diminished. The remainder of the impulse which remains after subtraction of the movements must in each case be greater than in an immobile apparatus, and this explains the prolongation of bone-conduction in fixation.

There is one premise in this theory which is not quite correct, and that is the molecular vibrations of the apparatus, for experiments in the living and in the skull have shown that by artificial immobilization of the apparatus the entire movement of the apparatus is reduced. Moreover, we find in otology cases in which a movement of the apparatus by co-vibration can be excluded. These are cases of complete obstruction of the canal up to the drum membrane with adherent cerumen or complete filling of the tympanum with exudate. Notwithstanding, in these cases bone-conduction is distinctly prolonged. In other words, the movement of the drum membrane in fixation is reduced, and the explanation of Bezold does not hold true which presupposes at least an undiminished vibration of this membrane.

Accepting Bezold's molecular movement of the sound-conducting apparatus from the bone, and accepting Bezold's contra-movement, which aids in prolonging sound-conduction, though it is not sufficient to explain this

phenomenon, I have come to the following explanation for prolonged bone-conduction in obstructions of the sound-conducting apparatus:

In the normal ear a certain amount of sound intensity is transferred by simple conduction by the tuning-fork handle through the bone to the sound-conducting apparatus. A small part remains in the apparatus as molecular movement. This is probably the part which is transmitted to parts which do not vibrate—for instance, to the anvil, then the ligament of the short process, and presumably to the hammer. The largest part of the sound intensity, namely, all sound waves which pass from the tympanic sulcus to the drum, and pass through the annular ligament to the stapes, are not perceived as molecular movements in the apparatus, but are transformed just as if they came from the air in mass movements in the sense of Bezold. In this same sense the stapes is thrust against the labyrinth water, and there causes molecular waves which, augmented by the waves transmitted from the bone, attain the basilar membrane and cause it to vibrate. If the sound-conducting apparatus is immobile a large amount of the sound intensity must be transmitted from the bone to the apparatus. The more the fixation has reduced the vibrating power of the apparatus, the smaller is the amount of sound intensity which can cause the apparatus to vibrate. The molecular movement which is perceived in the apparatus is, however, proportionally greater, and is transferred by the stapes to the labyrinth water. Whether the molecular intensity thus transferred to the labyrinth water is greater than that which is lost by the reduced concussion of the stapes in the labyrinth water, is unknown. The assumption that the former is greater than the latter seems probable. This, to my mind, is the only conclusive explanation of the prolonged bone-conduction in fixation of the sound-conduction apparatus.

CONCLUSION.

In order to understand in what way the weakest sound waves can excite the auditory nerve of the mammal, and then explain the wonderful development of its sound-con-

ducting apparatus, it is necessary for us to divide the complicated mechanism into a number of component parts, and to compare them with corresponding physical instruments. On the basis of the physical principle expressed in these instruments, we obtain the following conditions for the land mammals and man in one set, and the water mammals and the whale in the other.

The amplitude of certain sound waves which are to reach the basilar membrane can be favorably influenced as follows :

- I. Collection of the sound waves by means of a sound funnel.
 1. In land mammals and in man, in the auricle.
 2. In the whale, by means of the funnel-shaped depression on the outer surface of the tympanic bone to which the processus folii of the hammer is adherent at its apex (to transmit sound directly to the ossicular chain, excluding the auricle, auditory canal, and drum membrane, because the former are rudimentary in the whale, and the latter is separated from the hammer).
- II. Keeping the sound waves together as in a sound tube.
 1. In land mammals and in man, by
 - (a) The external auditory canal.
 - (b) The bony cochlear canal.
 2. In the whale, by means of the tubular bony vestibule and the bony cochlear tube.
- III. Transmission of sound waves of the air to the labyrinth water by including a machine driven by the sound as a motor.
 1. In land mammals and in man, in the form of
 - (a) The drum membrane according to the plate of the phonograph ; superior to it, however, in facility of vibration, because the tense membrane is of a string-like structure, and force of impact against the ossicular chain on account of the curve of its radial fibres externally. The result of this is a transformation of the sound

waves of the air into mass movements of the drum.

- (b) The ossicular chain which is connected with the drum membrane according to the style of the phonograph plate; superior to it, however, on account of its lever-like structure (von Helmholtz). (Effect: transmission of the mass movement of the drum membrane into sound waves and into sound waves of the labyrinth fluid by means of the moving ossicular chain, in the latter instance by the impact of the stapedial plate in the labyrinth fluid.)

2. In the whale, absent.

IV. Employment of the main sound ray—that means sound waves of great amplitude.

1. In the land mammals and in man.

- (a) Adaptation of the auricle by means of its muscles, thus facilitating the catching up of the sound.

- (b) Accommodation of the stapedial plate by the combined action of the tympanic muscles at that point of the ampulliform bony vestibule from which the main sound ray is reflected most intensely into the bony cochlear tube in the form of a sound thrower—that is, a rotating sound-source.

2. Absent in the whale.

V. Reduction of the obstruction to conduction.

- 1. In land mammals and man, absent—pathologically present in sound-conducting obstruction, whereby the sound-conducting apparatus is immobilized, though only applicable in direct conduction of sound to bone.
- 2. In the case of the whale, by means of the immobile, thickened ossicular chain according to a sound rod.

VI. Acoustic isolation—that is, the keeping off of accessory sound waves which would interfere with the sound waves on their way to the basilar membrane. This is not employed in physical instruments.

1. In land mammals and in man.
 - (a) By surrounding the labyrinth with air space.
 - (b) By the density of the bony labyrinth capsule.
 - (c) Irregularity of the walls of the air spaces, especially of the tympanum.
 - (d) Deflection of the round window backwards and the presence of a partition wall between the auditory canal and the round window. This prevents sound waves penetrating from the auditory canal and from the round window into the labyrinth fluid.
2. In the whale, by means of
 - (a) Increased extent of the air space surrounding the labyrinth.
 - (b) Increased density of the labyrinth capsule.
 - (c) Distention of the tympanum with a peculiar body.
 - (d) Occlusion of the niche of the round window with soft parts.
 - (e) Partial separation of the tympanum from the temporal bone, thus diminishing the direct transmission of sound waves from the first bone to the second.

This short resumé shows us the necessity of a compact machine in the ear of the land mammals and of man to transmit the sound in its original intensity to the labyrinth fluid, a condition which cannot be solved by simple molecular transmission. It also shows us the simple form, namely, that of a rod, to which this highly developed mechanism in the water-animals can be reduced, because in these a similar difficulty in the transmission of the sounds of the water to the labyrinth water is not present, and a different arrangement had to be furnished to secure the acoustic isolation of the labyrinth on account of the facility with which sound from all directions in the surrounding water is collected.

THE CHANGES IN THE EYE-GROUNDS IN OTITIC DISEASES OF THE BRAIN, THE CEREBRAL MEMBRANES, AND THE SINUSES.

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(From the Ear Clinic in Rostock.)

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PROFESSOR KÖRNER has previously reported on this subject in his *Mittheilungen aus den Grenzgebieten der Ohrenheilkunde*. I wish to add to the thirty-four cases which he published the more recent cases observed in the clinic in which the eye-grounds were examined and where the diagnosis was confirmed either by operation or by autopsy. Case 34 of Körner's statistics is also included in my statistics because the case had not come to a definite conclusion at the time of publication of former work.

I have divided the material according to the kind of intracranial disease and have separated the cases with one from those in which several complications were present. It is evident that we obtain more information as to the diagnostic value of the changes in the eye-grounds in cases of only one intracranial complication. Of the complicated cases each case is introduced only once in the table. The table shows us that changes in the eye-grounds in otitic suppurations within the skull are more frequently absent than present. We find them present in only 16 out of 54 cases. We further find that a single intracranial complication more rarely caused changes in the eye-grounds (6 in 37 cases) than the combination of several complications (10 in 14 cases).

The changes in the head of the optic nerve in sixteen cases

were bilateral in fifteen, though the original affection was one-sided. In one case the optic nerve on the same side as the diseased ear was affected. Both optic nerves showed changes to the same degree in six cases. The optic nerve was more affected on the side of the ear disease in five cases and less affected in four. The prognosis of intracranial affection is not influenced by the presence or absence of changes of the eye-grounds.

The time after which the optic-nerve affection disappeared after the intracranial suppuration had run its course could be determined in five cases. The severe changes in two cases had disappeared after fifty and fifty-four days. In one case the optic neuritis recovered in thirteen days on one side and in twenty-four days on the other. In another case the recovery took place in twenty days and in still another in fourteen days.

As a rule, a few days after the evacuation of the pus from the cavity there is a distinct improvement of the optic-nerve affection. In one case the symptoms diminished after the evacuation of an abscess of the temporal lobe, but became again more severe three weeks later with signs of meningo-encephalitis.

The increase of the neuritis after the suppuration in the cranial cavity has been eradicated does not necessarily mean an unfavorable prognosis. In one of our cases this symptom was observed and the patient recovered without further operation. In one case, previously mentioned, the neuritis had diminished after operation, then became more marked without any local or general disturbance in the condition of the patient. In one case which was more remarkable the changes in the optic nerve set in after the operation. They became more severe, and then disappeared without another operation being undertaken. Three other cases were similar to this one in this regard. These were all children who suffered, with one exception, from the same intracranial suppuration. In one case the changes in the eye-grounds increased after the operation. In another case the eye-grounds before and after the operation were always found

normal until the thirty-first day after the operation when changes in the optic discs were observed.

How can the increase or the presence of optic neuritis be explained after the operation in cases where, notwithstanding these new symptoms, the patients recovered without further operation? As is well-known, otologic literature contains many examples of these diagnostically unexplained cases with more or less well-developed brain symptoms that disappear in part without an operation. In many of these cases the changes were found in the eye-grounds. Occasionally these unusual observations were regarded as examples of serous meningitis or as œdema of the brain and hyperæmia. According to Professor Körner, in these cases there is probably a mild toxic non-bacterial meningo-encephalitis originating from the purulent focus in the temporal bone.

In the cases with only one intracranial complication, the following may be said as regards the condition of the eyes.

In the extradural abscesses, if they are not large enough to compress the brain or the sinus, no disease of the optic nerves will be observed. In our twenty-two cases they were absent in eighteen, and in Hansen's statistics of eleven cases in nine.

Of great interest is the condition of the optic nerves in purulent meningitis. It was formerly stated that this severe suppuration which extends over large areas at the base of the convexity, occasionally into the ventricles, always produced changes in the optic nerves. This, however, does not agree with the facts. Though Knies regards optic neuritis as one of the main diagnostic symptoms of purulent leptomeningitis, Pitt, as a result of his investigations in Guy's Hospital, found that the changes in the optic nerves in uncomplicated otitic purulent meningitis were always absent. He believes that the duration of the disease in his cases was too short for the development of neuritis. Barnick is of the same opinion. Our six uncomplicated cases had normal optic discs up to the time of death. Of the eight complicated cases two had no changes in the eye-grounds. In the remaining six there were changes. Hansen found in fourteen uncomplicated cases six without neuritis and eight with changes in the optic nerves.

Uncomplicated phlebothrombosis of the transverse sinus in our five cases caused changes in the discs in one case; in Hansen's eight cases in three. One-sided occlusion of the cranial sinuses does not seem to suffice to produce congestion of the back of the eye. In the gradual occlusion a sufficient collateral circulation must be thought of.

An uncomplicated abscess in the temporal lobe and a cerebral abscess complicated with an extradural suppuration showed no changes in the eye-grounds. In a complicated abscess of the temporal lobe, optic neuritis was present at the time at which the complicating meningo-encephalitis had probably not as yet set in. In Case 36, in which the eye-grounds were examined directly before the operation and found normal on the third day after operation (three days before death), changes were found in the optic nerves, though the brain-abscess had probably been complicated from the first with a progressive encephalitis. In a cerebellar abscess complicated with obliteration of the transverse sinus and meningitis, changes were found in the eye-grounds. Hansen found these changes in only one-half of the abscesses of the temporal lobe and one-third of the cerebellar abscesses.

The deductions which can be drawn from this material should of course not be considered final. We nevertheless think that the following points can be emphasized:

1. Changes in the optic nerves may be absent in any intracranial complication of aural and temporal bone suppurations.

2. They are more frequent in a combination of various kinds than when only one of the possible intracranial complications is present.

3. The more marked development of the eye-ground changes on one side does not prove the exclusive involvement or greater development of the original disease on the same side of the skull.

4. Changes in the optic nerves do not furnish aid in prognosis. The appearance or increase of the neuro-retinitis after evacuation of the pus from the cranial cavity does not of itself render the prognosis more unfavorable.

ON THE OCCURRENCE AND ABSENCE OF
CROSSED PARALYSES AND DISTURBANCES
OF SPEECH IN OTITIC SUPPURATIONS OF
THE BRAIN AND MENINGES.

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AT the twelfth annual meeting of the German Otological Society Heine reported a case where amnesic aphasia occurred with otitic brain abscess, though the abscess was situated in the right temporal lobe and the patient was right-handed. The author states that the explanation for this exceptional disturbance of speech in our case can hardly be given. The favorite distant action is questionable, owing to the smallness of the first abscess.

The discussion which followed treated the question whether the so-called distant action depended upon the size of the abscess.

Koerner said: "If I have correctly understood the speaker, he stated that at a definite time brain symptoms were present which could not be regarded as distant action on the part of the abscess, because the abscess was then too small. The so-called distant actions, however, not infrequently occur with small abscesses, and may be absent when the abscesses are very large. We must not explain their action only by mechanical means, by pressure on the surrounding tissues, because they are probably the result of an encephalitis, which starts from the abscess, and which is frequently mild and curable."

The other speakers, Passow and Hoelscher, agreed with Koerner, and spoke of pertinent cases.

The importance of this question, from the standpoints of diagnosis, prognosis, and indication for operation, has made it worth while to examine the case histories in the Rostock Ear Clinic during the past few years with a view to discovering the presence and absence of so-called distant symptoms in otitic intracranial suppurations. I shall formulate the question as follows: Are the crossed paralyzes and disturbances of speech observed in otitic intracranial suppurations caused by the pressure exerted by the accumulations of pus in the neighboring centres or tracts, or are they the result of an affection of the cortical centres or of the tracts?

Of course this question is not entirely a new one. In regard to the crossed paralyzes after the first successful operations for brain abscess, authors in general were inclined to restrict the generally accepted theory of the production of the crossed paralyzes simply from a pressure of the abscess on its neighborhood of functional importance.

The purely mechanical explanation of crossed paralyzes of the temporal lobe originated with Macewen and Von Bergmann. Both authors believe that these paralyzes are due to the pressure of the abscess on the temporal lobe, which extends to the motor cortical centres. Von Bergmann bases his views on the experience that pareses are usually present in the arms of the opposite side, or are more pronounced than in the legs, and believes that this is due to the fact that the lower part of the central convolutions which contains the centre for the arms is situated contiguously to the abscess in the temporal lobe, and is, consequently, first affected.

Sahli was the first to oppose this view, and to draw attention to the fact that a greater involvement of the arm over the leg does not necessarily mean a cortical paralysis, because in very incomplete cerebral hemiplegia the leg is less affected than the arm. It seemed, therefore, that the crossed paralysis occurring in these paralyzes could only be produced by an injury of the internal capsule.

This opinion was pronounced by Koerner in the first edition of his book. He says: "Von Bergmann has shown

that a growing brain abscess increases intracranial pressure in two ways: first of all, the tension of the cerebro-spinal fluid is increased everywhere where this fluid is situated, in the sinuses of the arachnoid and in the lymph spaces of the brain; furthermore, the pressure is transmitted by the firm brain substance not uniformly, so that the neighborhood of the abscess is more involved than the distant parts of the brain."

Preysing has shown that in reality increased pressure can force the region of the internal capsule out of its normal location.

Koerner states further that the inflammatory œdema, which in many cases surrounds the temporal lobe abscess, can easily extend to the internal capsule, while the central convolutions are protected by the Sylvian fissure against this force for some time, because the pia in this fissure does not become inflamed in the form of a lepto-meningitis. In addition, all disturbances which can be produced by an injury to the internal capsule may occur in an otitic abscess of the temporal lobe.

Thereupon Von Bergmann abandoned his view on the origin of crossed paralyses by direct injury of the motor cortical centres, and gives the Sahli-Koerner description in his third edition.

As direct pressure from the abscess, as well as its surrounding œdema, may produce this distant action upon the internal capsule, it is evident that the inflammatory œdema of an abscess near the internal capsule may involve the capsule before the abscess pressure is present. The presence of a crossed paralysis, therefore, does not prove that the abscess is large, but that either the abscess is large or there is an inflammatory disease of its surrounding tissues, an œdema, or, more properly, a toxic or bacterial encephalitis.

It would be interesting to determine how large an abscess must be in the temporal lobe to produce by pressure alone, without inflammatory changes, an involvement of the internal capsule. Cases which can be used in answering this question are, however, very uncommon. Koerner, in the first edition of his book, says: "I have not been able to find in

literature a case of temporal lobe abscess which has been carefully followed to its termination in which these symptoms [symptoms of an involvement of the internal capsule] have been completely absent." In the second edition a case of Grunert's is given, in which crossed paralyzes apparently were absent. In the third edition, in 1902, he was able to publish one single straightforward case. The right-sided abscess had produced no cross symptoms whatever. It contained about two tablespoonfuls of pus. The slight influence which the pressure of an intracranial suppuration exerts upon the surrounding brain to produce crossed paralyzes and disturbances of speech is shown by the observation of two unusually large otitic collections of pus in the skull. In one case (Lehr) there was a left-sided otitis with pseudo-cholesteatoma, which had perforated into the posterior cranial fossa. The abscess extended extradurally and posteriorly along the outer surface of the cerebellum and the occipital lobe up to the torcular Herophili, upwards to the lower third of the parietal bone, anteriorly to the squama. The dura over the temporal convolutions was destroyed. Pus had found its way into the fissure between the middle and lower temporal convolutions, and a part of the transverse sinus was necrotic. Notwithstanding, every evidence of a crossed paralysis was absent, as well as hemianopsia and disturbances of speech.

The second case reported by Koerner was an intracranial tumor complicated by an extradural suppuration. A true cholesteatoma starting from the left half of the occipital bone had perforated to the scalp and into the middle-ear cavities. In the latter place it had become infected by an influenzal otitis and suppurated. The tumor surrounded by pus was about as large as a goose's egg and forced the left cerebellar lobe, the posterior extremity of the temporal lobe, and the lower part of the occipital lobe so deep in that the compressed brain after the removal of the tumor required four weeks before it attained the level of the cranial fluid. Nevertheless there was no crossed paralysis, no hemianopsia, and no disturbance of speech.

In these two cases marked pressure on the sensory speech centre had produced no aphasia, pressure exerted on the

occipital lobes had produced no hemianopsia, and, notwithstanding that the pressure probably affected the lower motor cortical centres and presumably the internal capsule, there were no crossed paralyses.

The only explanation possible is that simple mechanical pressure is not sufficient to account for a functional disturbance of these centres and tracts and that the dura prevented the neighboring brain from becoming involved. It occurs occasionally that an otitic extradural abscess over the temporal lobe produces, without demonstrable lesions of the dura, crossed paralyses and disturbances of sensibility and, when the suppuration is on the left side, sensory disturbances of speech. In two of the three cases of this kind which Koerner has collected, the extradural abscess was of an unusually small size, so that the action of pressure does not come into account. No other explanation remains for those cases where local brain symptoms are observed in cases which get well than that suggested by Merkens, that the brain symptoms are produced by a toxic meningo-encephalitis originating in an infectious focus of pus, and heal spontaneously on evacuation of the original collection of pus.

The conditions in purulent lepto-meningitis are quite different. The cerebral symptoms of irritation and paralysis, if they are not produced by direct injury of the cranial nerves at the base, are affected from the cortical centres. It is indifferent whether this is the result of the pressure exerted by an exudate or by associated involvement of the cortex.

Professor Koerner has drawn attention to the fact that in the autopsies performed in cases of otitic meningitis marked flattening of the convolutions is observed on the convexity without a corresponding dilatation of the ventricles from increased ventricular fluid. In twelve uncomplicated cases, this observation was made in four. It seems that the hyperæmia of the meninges and the congestion of the cortex are sufficient to produce a swelling of the brain tissue, as is noticed by a flattening of the gyri and an obliteration of the sulci. It has not been determined what influence the presence or absence of these changes exerts upon the symptoms of meningitis. Of all the symptoms of otitic meningitis the motor

sensory and mixed disturbances of speech are of the greatest interest because they complicate the differential diagnosis with brain abscess, as for instance in an important case of Kuhn's in which left-sided otorrhœa was associated with a purely sensory aphasia, just as is frequently observed in brain abscesses. The motor aphasia is most frequent in meningitis, according to Koerner, and is produced by a pronounced exudate in the Sylvian fissure. The rarity of a distinct aphasic symptom-complex in otitic meningitis justifies the publication of the following case of complicated sensory motor aphasia.

B., thirty-five years old, was brought to the Clinic on March 9th. On February 23d she had suffered from vertigo, on the next day fever, headache, general prostration, pain in the limbs. Then no vertigo and no vomiting. Temperature varied, yesterday rose to 40° . Pulse retarded. Occasional pain in the left half of the head. Until yesterday there was an area about 3cm above the left auricle which was tender. An otorrhœa has existed from the left ear since childhood. On admission a large, well-built woman, temperature 38° , pulse 78. Sensorium clear. The patient answers questions correctly but appears very tired. She complains of pain in the entire left half of the head, especially in the left forehead. In the ear there is some pus. The drum is practically totally defective and no ossicles are to be seen. The tympanic mucous membrane is very red. There are no symptoms on the part of the mastoid process. A careful functional examination could not be undertaken on account of the patient's condition. Eyes normal. The fundus showed a slight congestion of the vessels. The discs are not prominent and the margins are defined. She correctly designates objects. No rigidity of the neck.

March 10th.—The patient is in good spirits, converses with her husband, and complains only of occasional headache. Temperature during the day rose to 39.9° ; pulse, however, did not go beyond 96. With the rise of temperature, though the sensorium remained regular and without so-called slow cerebration, a striking disturbance of speech set in. Rigidity of the neck absent. Power in the two hands preserved. No changes in the eye-grounds nor in the fields. The patient is unable to remember certain words and becomes very much excited over not being able to

find the proper term. Objects which are held before her cannot be correctly designated. Lumbar puncture evacuated a clouded fluid under pressure which contained an increased quantity of leucocytes.

March 11th.—During the night restless. No vomiting, no change in the fields. Ocular movements normal. Pulse normal. No facial paralysis, no rigidity of the neck. The pulse reflexes are wanting. Kernig's contracture pronounced, left more than right. Temperature remained over 39° ; pulse regular, 96. In the evening chronic convulsions in the right hand. The patient moves the head in all directions. No rigidity of the neck, no passive movements, regular pulse, and eyes normal.

March 12th.—During the night vomiting. Temperature 39.9° , pulse regular, respiration 44. The patient is completely aphasic. She does not protrude the tongue on being asked to do so, but follows the finger in the examination of her ocular movements. In the morning it is very distinctly to be seen that she endeavors to answer questions but is unable to do so. Reflexes and Kernig's symptom as yesterday. In the eye-grounds no change. Moderate convulsions in the right hand. Restless movements of the left leg. Towards evening there is moderate rigidity of the neck. The fluid obtained by lumbar puncture contained many diplococci with an undefined capsule in these cells. They resemble the Fränkel-Weichselbaum. On growth numerous diplo- and streptococci appear.

March 13th.—Conjugate deviation to the left. Pupils wide, they do not react alike. The right arm cannot be moved. With the left the patient often grasps her head. Incontinence of urine. The pulse rises rapidly to 154, respiration 72. Death at 10 P.M. No autopsy.

ETIOLOGY AND PATHOLOGY OF MASTOID EMPHYEMA COMPLICATING ACUTE PURULENT OTITIS MEDIA.

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Abridged Translation, by ADOLPH O. PFINGST, M.D., Louisville, Ky., from
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BACTERIOLOGICAL, histological, and clinical study of a series of cases of disease of the temporal bone have convinced me that these cases should be classified into those associated with acute and those complicating chronic otitis media. It is a fact now generally recognized that the etiological factors in the two forms differ, the necrosis occurring in the acute cases depending upon the general condition of the patient, and seldom being met with in the healthy subject, while in the chronic cases the cause of the bone affection is purely local. The pus in cases of chronic otorrhœa is frequently under pressure, and in a state of more or less decomposition, the result of improper drainage, to which is ascribed the involvement of the bone. Exceptionally, retention of pus leads to necrosis in the acute cases, notwithstanding healthy condition of the subject.

There was a time when all destructive disease of the bone was grouped together under the general head of "caries." In late years there has been a tendency among surgeons to retain this term only for certain forms of bone disease. In the text-books on otology, much ambiguity still exists as to the exact meaning of the term. Reference to the latest works on otology shows that cases of exposed bone by necrosis of the mucous membrane of the air-cells, or by

separation of the periosteum from the bone, destruction by malignant growths, granulations of the mucous membrane of the tympanic cavity, with coincident changes occurring in the bone, are all placed in the same category. The first effort to effect a new nomenclature to differentiate between necrosis, pressure atrophy, malignant bone disease, etc., was made by Bezold eleven years ago. Since then Koerner, Bruehl, and a few others have also advocated a definite classification of these affections.

In my study of the etiology and pathology of mastoid empyema complicating acute middle-ear suppuration, I have endeavored to solve two principal questions: first, why fistulæ form in the bone in only a certain percentage of acute middle-ear inflammation, and the majority of cases end in resolution without involving the bone; and, second, to what pathological process the so-called cases of "caries" can usually be attributed. In explanation of the first question, Bezold says that the most important of the deciding factors in the encroachment of the pus on the bone is the pressure under which the pus is kept in the tympanic cavity by unfavorable conditions for drainage, such as small size or unfavorable position of the perforation in the drum, but that the position and size of the communication between the mastoid cells must also be looked upon as a factor of moment. He does not believe that the kind of micro-organism influences the liability of bone affection or the subsequent course of the disease. Koerner looks upon the late perforation of the drum as a most important element in the etiology of mastoid involvement. He attaches more importance to the virulence of the infecting element than Bezold, and also lays stress upon the general condition of the patient in this connection. Koerner also believes that the swollen mucous membrane of the tympanic cavity may encroach upon the outlet of some of the mastoid cells, thereby creating closed pus-cavities, which may remain even after subsidence of the pus formation in the tympanum.

To get a better conception of middle-ear disease and its complications, it would not be amiss to point out the conditions that exist in the middle ear in cases of closure of the

Eustachian tube. Lessened air-pressure results in sinking of the drum, hyperemia (*ex vacuo*), and a transudation of serum. This transudation never exceeds certain bounds, and differs in this sense from the exudation of an inflammatory condition which may terminate in rupture of the drum. In the transudation due to closed tube, reabsorption only follows when the patency of the tube is restored. In contradistinction to these cases, we find in the acute middle-ear inflammations due to bacterial infection an exudate thrown out varying in amount. In those cases where the drum remains intact and the tube is open, the exudate is removed by absorption. The old idea of drainage through the Eustachian tube has almost entirely been abandoned. However, the permeability of the tube has a bearing on the course of these cases in ventilating the tympanic cavity, and thereby favoring absorption. In probably half of these cases, absorption does not take place rapidly enough, and perforation of the drum follows, if not evacuated by incision. In these cases the Eustachian tube is often closed, which accounts for the slow absorption. Many of them run their course in a short time after rupture of the drum, and terminate in closure of the perforation and restoration of function. However, in a certain percentage of these cases the otorrhœa persists, notwithstanding permeability of the tube. According to Bezold, the difference in the duration of otorrhœa depends upon the size and extent of the pneumatic cells of the mastoid bone. He believes that involvement of some of the bone cells is the main if not the sole cause of a continuance of the discharge of pus from the tympanic cavity beyond the time that acute cases usually terminate.

In a small proportion of these cases, with or without persistence of the otorrhœa, and exceptionally in cases without the history of otorrhœa, a fistulous tract forms in the bone, and discharges pus on the exterior. The fistulæ form, as a rule, where peripheric pneumatic cells are present. The defect in the outer table of the bone is nearly always round, and seldom exceeds 0.5cm in diameter. In contrast to this, perforations in the inner table, into the posterior cranial

fossa, are sometimes 2 to 3*cm* long. The fistulæ in the outer table are nearly always plugged with granulation tissue, and they always lead to a pus cavity. Removal of the bony edges of the tract exposes an irregularly round cavity, varying in size, and filled with pus and granulation tissue. In some cases two or more tracts have been observed leading to the same cavity. The bone in the immediate vicinity of the opening is usually so soft and vascular that it can hardly be distinguished from the granulation tissue, and it can easily be removed with a curette. These cases nearly all terminate, in from three to six weeks after operation, in closure of the wound and the perforation in the drum with restoration of function. Cases of delayed healing are nearly always due to a weakened or diseased condition of the system. New fistulous tracts never develop from a cell which has been opened externally. Statistics show that fistulæ form proportionately with more frequency in adults than in children, more in the male than female, and more frequently on the left than the right side. A feature of interest and importance is the fact that fistulous tracts have never been found to lead from the tympanic cavity, and in but a single instance from the mastoid antrum. Even in cases where dehiscences were present on the floor of the tympanum, the pus usually remains within the bounds of the cavity. Whenever the pus is not under high pressure the surrounding bony structure has a tendency to become thickened and hard rather than be involved in a necrotic process.

To facilitate the bacteriological study of suppuration of the middle ear, I have made a division of **empyema complicating general diseases**, and **genuine empyema**.

In the category of genuine empyema, we can place such cases caused by peritonsillar abscess, by accidental forcing of water through the Eustachian tube, and by traumatism, or, in other words, the cases in which the general condition of the patient is good. My examinations were made by preparing three strained specimens of the pus, and staining five minutes in concentrated solution of gentian violet, decolorizing until stain is barely visible in the pus cells, and

counter-staining. According to Hasslauer's bacteriological examinations, the diplococcus of pneumonia is most frequently present in the cases of genuine empyema, the streptococcus somewhat less frequently, while the staphylococcus is present in only a small percentage of cases.

In my own examination of a limited number of cases, I was able to find the diplococcus in only 20 per cent. of cases. The infrequency of the staphylococcus has led some to attach no importance to it in the causation of acute cases. Its frequent presence in the chronic cases has, however, led to the belief that the staphylococcus is an important factor in making the acute cases chronic. While this kind of pyogenic germ may be a factor in the production of chronic cases, I believe that even with this bacterium present, acute cases do not become chronic, unless the vitality of the body is below par.

The general diseases which most frequently lead to otitis media are scarlet fever, measles, influenza, diabetes, and tuberculosis.

It is generally conceded that in the acute empyema of scarlet fever the streptococcus is nearly always present. Leutert has gone so far as to assert that the otitis of scarlet fever is never brought about by any other kind of bacteria. The streptococcus also predominates in otitis of measles. In influenza otitis the same forms are present in the same proportion as in the genuine cases, with the addition of the influenza bacillus. In tuberculous cases the streptococcus is present more frequently than the diplococcus; the same is true of the otitis complicating diabetes.

Bacteriological research has shown that the same kind of bacteria are present in uncomplicated middle-ear suppuration as in those complicated with empyema of the bone.

In cases with fistula-formation, the streptococcus has been found to predominate. From my own and other bacteriological examinations, we can conclude that bacteriology has added little or nothing to our knowledge of ear disease, and we can still adhere to the conclusion of the antibacteriological period, that abscesses of the tympanic cavity and of

the mastoid cells take a different course in the healthy individual than in the debilitated or diseased.

Literature furnishes but little information regarding the microscopic changes in the bone during acute otitis media. Politzer merely speaks of an increase in round cells in the marrow spaces of the spongy bone. Preysing, who made quite a study of the bone in acute abscesses of the middle ear, was never able to find any extensive changes in the bone. Habermann, who also made researches in this line, found that the inflammatory process always started in the marrow. The marrow spaces became enlarged and filled with new-formed connective tissue and some newly formed bone lining the osseous trabeculæ.

Siebenmann describes the bone-changes as dependent upon an absorption process and also an atrophy.

I have been able to secure fourteen specimens for microscopic study. They were all taken from cases in which perforation of the cortex had occurred. Seven of the cases were of the so-called genuine variety, six occurred during the course of constitutional diseases, and in one a doubtful constitutional affection was present.

My specimens were, with a single exception, secured at the time of the operation and placed at once in the fixing solution. They were all decalcified in 3-5 % nitric acid. The best specimens were obtained by fixing in Mueller's fluid and double staining with Grenacher's hematoxylin and ammonia carmine solution. Specimens of normal bone were also submitted to examination for sake of comparison.

The cortical layer in the normal-bone specimens varied considerably in thickness, and was nearly always separated from the pneumatic cells by cancellous bone. The cortical layer was characterized externally by the irregularity of the arrangement of the bone, internally by the lamellar arrangement, the Haversian, interstitial, and fundamental lamellæ all being present. The compact bone of the mastoid was well supplied with Sharpey's fibres, which penetrated the bone from the periosteum. The pneumatic cells of the normal mastoid were lined with a delicate mucous membrane of simple squamous epithelium. The mastoid of the

child was found to differ from that of the adult only in the arrangement and size of the pneumatic cells. In the child they are smaller and some closer to the antrum than in the adult.

Of the fourteen bones removed from cases of middle-ear abscess, all but four showed decided and identical histological changes which could well be spoken of as a spongy transformation. In the ground substance of the bone, closely crowded spaces about the size of a bone corpuscle were visible. The spaces were oval or round, sometimes oblong, and in parts anastomosed so as to form canals. None of them contained bone cells, or, in fact, any kind of cell, but they were all partially or completely filled with a homogeneous or finely granular mass. The contents of the spaces did not take the hematoxylin stain, appearing in the stained specimens as pale-blue or glassy masses. The spaces were most abundant in the compact bone, but were exceptionally formed in the trabeculæ of spongy bone. Between them normal lacunæ containing bone cells were visible. It was noticeable in the compact bone that they were present in the fundamental and interstitial lamellæ, but not in the Haversian. They frequently come in close contact with Volkmann's canals. This spongy transformed bone always formed a sharp line of demarcation at its junction with normal bone. In some portions of the bone where spaces were cut obliquely, they were continuous with normal perforations of Sharpey. In other portions normal fibres of Sharpey were seen between the spaces. These facts and the ability to trace the described spaces to the periosteum and endosteum led to the assumption that the spaces were enlarged Sharpey's canals containing inflamed and swollen fibres of Sharpey. These changes in Sharpey's fibres were noticeable only in cases in which pus had perforated the cortex of the mastoid bone. They occurred immediately after perforation had taken place, and disappeared again or, rather, returned to normal after four to twelve weeks.

Changes similar to those described have, as far as I could find, never been described before. This can be accounted for

in the fact that Sharpey's fibres are not near as abundant in other bones as they are in the mastoid, and hence have been overlooked. My specimens were submitted to a number of pathologists, among them Prof. von Ebner, of Vienna, Prof. Mollier, and others, all of whom were unfamiliar with the described changes, but were unanimous in their belief that the spaces were the outcome of changes in the perforating fibres of Sharpey. The enlargement of the spaces was evidently brought about by pressure, and not by absorption of bone by osteoclasts. We may conclude that we have had to deal with a peculiar heretofore unobserved transformation and resorption of bone which can take place only in bone containing Sharpey's fibres.

This spongy transformation of the bony ground-substance was only a forerunner of the changes in the marrow spaces and the neighboring pneumatic spaces which lead to further destruction of bone. The mucous membrane of the marrow spaces becomes very much thickened, forty- to eighty-fold, and finally transformed into granulation tissue. The blood-vessels in the periosteum in many specimens became smaller than normal, and some were found partly filled with a granular material, probably coagulated plasma. In the cases complicating constitutional affections, the thickening of the mucous membrane was less pronounced, the amount of thickening usually maintaining an inverse proportion to the gravity of the constitutional diseases.

A noteworthy histological feature of the spongy transformed bone was the absence of pus between the bone and the mucous membrane. In the parenchyma of the red marrow, increase in the cellular elements and connective tissue was a constant feature. The consequent pressure caused atrophy of the fatty tissue in the marrow, and finally also of the ground substance of the bone. Pus was not present in the marrow of any of my cases, differing in this way from cases of primary infectious osteomyelitis as it occurs in the long bones. While the changes in the mucous membrane and marrow spaces were the result of an active process, the changes in the ground substance of the bone must be looked upon as a

secondary process. In the bony wall of the empyematous cell and the neighboring marrow cells, erosion of the lacunar spaces had taken place, causing a roughness of the surface. These changes were not so frequently noticed in the spaces more remote from the pus cells. Erosion of the lacunæ resulted through the osteoclasts, as was evidenced by their presence in recent specimens, in which they were found lying in the crevices of the rough surface of the pus cavity. Some round cells of granulation tissue were also found in these crevices. A gradual dissolution of bone followed, which finally led to perforation of the bone. The spongy transformed bone soon became invaded by the exuberant tissue of the neighboring marrow spaces and pneumatic cells. At the time that the process breaks through the mastoid cortex, or frequently several days prior to this, osteogenetic cells could be found in the wall of the pus cavity and the neighboring spaces. After several days they began to form new bony tissue. Osteoblasts formed in all of the spaces surrounding the fistulous tract, new bone formation progressing rapidly.

The osteoblasts can be demonstrated for some time after the formation of the fistulæ. In one case, in which the tract had remained open for three months, osteoblasts were still abundant, but had changed their shape and position somewhat. The defects in the bone were not completely filled with new-formed bone in any of my cases.

ON OPERATIVE TREATMENT OF PURULENT MENINGITIS.

BY PROFESSOR V. HINSBERG, Breslau.

Translated by Dr. ARNOLD KNAPP, from *Zeitschr. f. Ohrenheilk.*, Vol. L., 1905, German Edition of these ARCHIVES.

IN recent years a number of observations have appeared which show, without a doubt, that a purulent meningitis of otitic origin is not always fatal, and that occasionally after suitable treatment recovery takes place. Three years ago I collected a number of cases in which lumbar puncture showed the presence of bacteria in the cerebro-spinal fluid and in which unmistakable clinical symptoms of meningitis were present, which nevertheless recovered after the primary focus in the labyrinth had been eradicated, and others where lumbar puncture was repeatedly performed. We must assume that the infection at the time of operation had penetrated the dura and had been rendered inert by the natural immunity of the body as soon as the operation on the ear had prevented the access of fresh infection. On the other hand, there are numerous observations published where an apparently circumscribed meningitis, notwithstanding removal of the primary focus, rapidly gives rise to a diffuse and fatal meningitis. The question naturally occurs whether in these cases a favorable result could not have been obtained if the infectious focus situated within the meninges had been exposed and drained.

The experience of general surgeons in the treatment of complicated fractures of the skull with laceration of the dura seems to encourage attempts in the treatment of otitic menin-

gitis in this direction and a number of such attempts have been made, probably many more than have been reported. These attempts, however, were at first without result. Up to 1901 there were only three cases of otitic meningitis on record in which an incision of the dura had exposed and cured a circumscribed focus of pus in the pia. One case was operated on by Macewen, another by Jansen, and the third by Lucae. Friedrich of Kiel is the only one of the otologists who has advocated an active treatment of meningitis. He recommends incision of the dura at the site of infection and then a counter opening in the spinal canal by means of a laminectomy, thus permitting drainage of the entire dural sac. He unfortunately was not able to report any successful cases. It seemed to me worth while to present certain recent observations which show that the incision of the dura apparently exerts a favorable influence on meningitis even if there is suppuration within the meninges.

The first observation was that of a man twenty-four years of age who was admitted to the surgical clinic on account of a fracture of the base. The course after the injury was favorable, so that on the thirteenth day the patient was extremely anxious to return home. On the fourteenth day suddenly a severe otitis media developed on the right side, probably from infection of a hematoma in the tympanum from the tube. The temperature rose to 39° C., 102° F., and the patient became stuporous. Towards evening the right mastoid process was very tender. We proceeded to open the mastoid process, fearing that the retention of pus in the middle-ear cavities would be in direct communication with the interior of the skull on account of the line of fracture. At operation a fracture was found which passed through the mastoid process. The mastoid cells were filled with blood but no pus. There was also an extradural hematoma of the middle cranial fossa. The dura was apparently normal. The result of this operation was absolutely negative. The temperature continued to rise, the patient's stupor increased, and all symptoms of a beginning meningitis were present. The site of infection apparently was a fissure passing through the tegmen of the tympanum and including the dura. Not hav-

ing very much faith in the expectant treatment, we thought it indicated to try draining the exposed infected subdural cavity. Twelve hours after the first operation the dura above and anterior to the ear was exposed by a skin and bone flap. The dura was incised. It appeared normal and pulsated. The exposed pia seemed very œdematous and about a large vein there was a distinct yellowish infiltration which increased towards the base. The culture obtained from this region gave colonies of staphylococci, confirming the diagnosis of purulent meningitis. In order to drain the infected area, a large tampon of iodoform gauze was introduced between the pia and the dura beneath the temporal lobe. The bone flap was then replaced. At first the patient's condition did not seem to be changed. The temperature, however, fell on the next day. The sensorium remained disturbed, then pronounced rigidity of the neck set in. This was followed by a gradual loss of fever and a disappearance of all the meningeal symptoms, so that the patient on the seventh day after operation had a normal temperature and a clear sensorium. A distinct paraphasia was referred not to the meningitis but to a direct traumatism of the exposed part of the brain. The patient then recovered completely during the next seventeen days. The healing of the wound was disturbed locally by the formation of a large cerebral hernia. Then when we had begun to regard the patient as saved, a severe disturbance set in associated with fever, convulsions in the right half of the body, and unconsciousness. As this followed the attempt to replace the cerebral hernia, this was made responsible and the bone flap loosened. These threatening symptoms again disappeared until, six and one half weeks after the injury and one month after the second operation, a fulminating meningitis set in and the patient died within three days. At autopsy a large number of disseminated foci were found whose age cannot be definitely stated, though they appeared normal.

Though in my opinion this case shows that the operation was responsible for this marked improvement, it is not a proof for the curative value of an incision of the dura as the patient finally succumbed to meningitis. I was, therefore,

very much pleased to find in literature a description of two similar cases which recovered.

One patient, reported by Poirier,¹ was a man thirty-two years of age, addicted to alcohol, who had fallen down a flight of stairs and contracted a fracture of the base of the skull. He was taken to the hospital, but left on the third day though he had some fever (38.5°). On the following day, notwithstanding headache, he attempted to go back to work, but had to desist at midday. A picture then rapidly developed very suggestive of meningitis. The temperature rose to 39.8° . Delirium, increased reflexes, but no pain. The patient was immediately readmitted to the hospital, and, as the condition did not improve, on the sixth day after the injury the skull was opened above each auditory canal and an area 6cm. by 5cm. exposed. The exposed tense dura was incised by a crucial incision and a large quantity of bloody, tenacious fluid escaped. On lifting the temporal lobe, two drainage tubes were introduced on each side between the temporal lobe and the bone of the skull. On that evening the temperature dropped to 38.4° . On the fourth day it became normal and the general condition improved so rapidly that the patient was cured after five weeks. The cerebro-spinal fluid contained the staphylococcus albus.

The case reported by Witzel² is quite similar. Four days after an injury (fracture of the base) symptoms occurred referable to a meningitis starting from the right ear. On incising the dura and draining, the symptoms promptly disappeared and the patient recovered.

In two other cases in which meningitis followed operations on the mastoid process, Witzel³ was able to obtain temporary improvement by this procedure. In one case, twelve days later, a generalized fatal meningitis set in. In the other the patient at first did perfectly well, and was presented as cured before a society of physicians. Then, apparently after

¹ Poirier, *Bulletin et mém. de la société de chir. de Paris*, T. 27, p. 17. Ref., *Zentralbl. f. Chirurgie*, 1901, p. 1181.

² Witzel, "Die operative Behandlung der phlegmonösen Meningitis," *Zeitschrift für die Grenzgebiete der Chirurgie und Medizin*, Bd. 8.

³ *L. c.*

a diagnostic puncture, a brain abscess developed which proved fatal six months after the operation.

A slight improvement was obtained in a case of extensive meningitis by Haberer.¹ The origin in this case was an otitis of the temporal bone, apparently not in connection with the ear.

In another case reported by Witzel² there was a complicated fracture, with ulceration of the dura, and a large quantity of pus escaped from the meningeal bag. Recovery occurred after a broad incision, with counter opening and drainage through a suction tampon.

The second case reported by Luc³ belongs in the group of traumatic meningitides, as the meningitis followed the extirpation of a tumor in the frontal sinus. On the ground of these clinical symptoms Luc incised the dura, and found a circumscribed focus of pus in the pia, puncture for an abscess being negative. In this case recovery also followed, though a brain abscess developed, following puncture.

A very striking and brilliant case is the one reported by Barth, of Danzig, before the Surgical Congress in 1901. This was a case of extensive suppuration throughout the soft spinal meninges, following a penetrating injury. The case recovered after incising the dura and liberating three tablespoonfuls of pus.

Two additional cases can now be added to this list.

The first one was reported by Kuemmel, of Heidelberg. The patient, a girl eleven years of age, suffered from high fever, with rigidity of the neck, for eight days, which could not be explained by her ear disease. At the radical operation—a cholesteatoma being present, we had penetrated the oval window—the dura of the middle and posterior cranial fossa was incised. The pia was clouded and thickened. A diagnostic puncture of the brain was negative. After operation, at first improvement, then two weeks later rigidity of the neck, so that another incision of the dura was made over

¹ Haberer, *Wiener klin. Wochenschr.*, 1903, No. 13.

² L. c.

³ Luc, "Méningite suppurée aigue traumatique." etc., *Archives internationales de laryngologie*, 1897.

the tegmen, when two tablespoonfuls of a clouded fluid escaped. A drainage tube was inserted into this dural opening. Recovery took place slowly, complicated by an attack of erysipelas.

In the second case the clinical symptoms suggested meningitis, though the exact diagnosis could not be made. Vertigo (suppuration of the labyrinth), headache, chills, Kernig's sign with an unclouded sensorium, had existed for eight days. At operation the dura of the middle fossa was incised. The symptoms rapidly disappeared and the patient recovered.

A very remarkable case was that reported by Kuemmel, of Hamburg, because it shows that even severe diffuse meningitis, where the diagnosis was confirmed by the clinical symptoms and by the result of lumbar puncture, was amenable to surgical treatment.

The patient, a man thirty-three years of age, fell on the back of his head from a surface car on December 24, 1904. He remained unconscious for a length of time, then his condition improved for two days. There was a discharge of cerebro-spinal fluid from the nose. Increasing vertigo and headache, especially in the occiput and forehead, set in on the third day. Then tinnitus and deafness on the right side. On December 30th, six days after the injury, he was admitted to the hospital. On admission the patient was able to walk to the ward. He complained of pain in the forehead and occiput. There are no symptoms of paralysis. Eyes intact. Deafness on the right side. There is no injury of the drum. Diagnosis: fracture of the base, passing through the lamina cribrosa and through the ethmoid. The headache increased, the stupor became more pronounced. The temperature rose to 40°, though the pulse was not retarded. On January 2d, completely unconscious, marked rigidity of the neck, and strabismus. Lumbar puncture evacuated 20ccm of a thick, purulent fluid. January 3d, severe symptoms continue. Lumbar puncture has had no result. January 4th, the patient is apparently moribund, pulse is small, there are no focal signs. Without narcosis, on each side of the occipital bone extending to the parietal, a circular trephine opening is made of

about two inches in diameter, which was to be succeeded by an opening of the spinal canal. The dura is excised in these regions. The arachnoid is cloudy and injected. A moderate amount of purulent fluid is liberated. Suction tampons are introduced on each side. The bone flap is replaced. January 5th, conditions very much improved. The pulse is stronger, the sensorium less clouded. Swallowing is not possible. T. 38.8°. On the second day after operation lumbar puncture showed that the cerebro-spinal fluid was still clouded. On the sixth day it was perfectly clear. On the following days the improvement was marked. On the fifth day there was no fever, the patient ceased to cry out, and was able to swallow. Left facial paralysis. On the tenth day the patient's mind is perfectly clear. There is no pain. There is a pronounced disturbance of speech and writing. He is able to understand everything, but always replies with the same words. This condition gradually disappeared in six weeks. In the middle of February, 1905, the patient was discharged completely restored.

Smears from the cerebro-spinal fluid and from the blood were sterile. Kuemmel nevertheless believes that the diagnosis of diffuse meningitis is correct.

In another case reported by Kuemmel, improvement took place after drainage of the dural sac, so that the loss of sensorium which was previously present disappeared. The rigidity of the neck diminished and the headache was improved. Meningitis occurred after an operation for a sacral tumor in a child. The patient died shortly after incising. The autopsy showed that some other very severe conditions were present in addition to the cerebro-spinal meningitis (pelvic peritonitis), so that a complete recovery could not have been expected, even if the meningitis had been cured.

There are, therefore, including the previously mentioned cases of Macewen, Lucae, and Jansen, to-day at least ten cases where meningitis was cured after drainage of the sub-arachnoid space, and five in which a decided improvement took place. In all cases the clinical symptoms before operation were so severe that it could be reasonably suspected that the cases would have died in a short time. In all cases

the improvement followed immediately after operation, so that a connection between these two seems extremely probable. For these reasons it seems that an active treatment of meningitis is not only allowed but, under certain conditions, as in the case of Kuemmel, indicated. The way in which a successful result can be achieved is distinctly shown by these cases. Of greatest importance is the broad exposure of the area where the infection of the meninges took place and where it is reasonable to suppose the principal focus is situated.

In the cases not secondary to the ear or to the nose, traumatic meningitis, this indication can easily be met. The situation is usually defined by the external injury and is usually very accessible. According to Witzel, we should not hesitate to sacrifice as much of the bony skull as is necessary to expose macroscopically the healthy pia. He has himself removed parts of the skull as large as the hand. He does not regard the subsequent plastic operation to cover the defect as particularly grave.

More difficult are the conditions in the cases of meningitis originating from the ear, because from the ear the infectious agents first approach the base of the brain, a part which is not so accessible to operation.

On the other hand, the cases just mentioned show that a successful termination is not excluded as long as the meningitis begins in the middle cranial fossa, namely, at the base of the temporal lobe.

Up to the present time it has not been shown whether meningeal foci at the base of the cerebellum can be exposed by operation. This question, however, is of the greatest interest to the otologist because most otitic meningitides start in this region. The internal auditory meatus, in addition to the sinus wall, is most frequently the site of entrance of infection to the posterior cranial fossa. The former structure is situated at a considerable depth, though we have learned that by removing the posterior surface of the petrous bone and extirpating the posterior parts of the labyrinth this region can be exposed. I have recently had occasion to open and drain a circumscribed intrameningeal abscess in

this area. At the autopsy which occurred a few days later, the patient dying from a cerebellar abscess, we found that this area had been sufficiently exposed and that a further extension of the meningitis had been retarded.

Though theoretically it seems desirable to expose the meningitis just at the site of infection, especially in beginning infections, this is not always essential, as is seen in Kuemmel's case. In this case the infection probably travelled through a fraction of the lamina cribrosa, an area which is probably not accessible. At the time of operation the meningitis had extended over the entire base and the spinal canal, and the location of a dural fistula in this region would probably have not shown any distinct improvement. Kuemmel preferred to drain the deepest parts of the base of the brain—in other words, the region of the occipital lobes.

The second factor essential to the success of the operation is an extensive drainage of the surrounding tissues of the infected area, because we know from our pathological investigations that this area is presumably already infected, although it may appear macroscopically normal. Witzel recommends, in order to produce auto-irrigation of this infected part, that is, from a suction exerted upon the liquor to constantly irrigate the site of infection with fresh liquor, the insertion of large tampons which present radiating prolongations in all directions. These tampons should remain until adhesions between the dura and the pia take place about the primary focus. This in Witzel's experience means two weeks. In removing the tampons care must be exercised not to break up the adhesions. They should be removed under constant irrigation with salt solution.

The cases reported have shown that the danger of the patient is not relieved when the meningitis is apparently brought to a standstill. Very frequently a cerebral hernia takes place. It is acknowledged that it is not always possible to prevent secondary destruction of these prolapsed parts, as after weeks or months a new fatal complication may occur.

A more difficult question is the following: In what cases and when should we operate? I think our present experi-

ence tells us that the chances for recovery are more favorable the shorter is the time between the infection and the exposure of the area. This is not so difficult if we recognize the moment of infection. That is perfectly possible in many traumatic and some otitic meningitides, especially those after fracture of the base. In other otitic meningitis cases the symptoms at the beginning are so ambiguous or so moderate that an exact diagnosis is not possible, especially as lumbar puncture frequently gives us uncertain results.

In these cases we must either wait until the diagnosis is clinically confirmed—in other words, when it will be too late, or we must resolve to do a diagnostic operation, which consists in exposing the pia in the attacked area.

My experience shows that this diagnostic operation does not carry with it great danger for the patient, and it is just as much indicated as a puncture of the brain in suspected abscess or the opening of the sinus in phlebitis.

Though the chances for recovery are greatest in beginning cases, Kuemmel's case of generalized meningitis, which was characterized with the severest clinical symptoms and with the purulent cerebro-spinal fluid, shows that recovery may still take place. We therefore must to-day abandon the dictum previously pronounced that diffuse meningitis is a contra-indication to operation. We are no longer correct in designating these cases as lost. We must always make the attempt to improve the conditions by lumbar puncture if an incision of the dura is not at once undertaken. The results of Gradenigo and others show that this way may be successful. To my mind, drainage after incision of the dura more nearly corresponds to surgical principles as, in addition to the auto-irrigation, it acts constantly, while the puncture of the spinal canal is only temporary. Moreover the site of the lumbar puncture is usually far removed from the infected area. Hence a drainage of the arachnoid space at or near the infection seems more reasonable.

It seems probable that a certain part of the purulent meningitides can be cured by active treatment. The proportion of these cases is, of course, unknown. I myself do not consider that the proportion will be very large on account of the

difficulties caused by the localization, the diagnosis, and the dangers of after-treatment, so that a conjunction of favorable conditions is necessary in order that the termination may be a happy one.

REPORT OF THE TRANSACTIONS OF THE NEW YORK OTOLOGICAL SOCIETY.

By THOMAS J. HARRIS, M.D., SECRETARY.

MEETING OF MAY 22, 1906. THE PRESIDENT, DR. E. B. DENCH, OCCUPIED THE CHAIR.

Presentation of Cases.

DR. HERMAN KNAPP presented a patient upon whom he had operated for a **large subperiosteal abscess in the temple** and said: "The skin was a little raised, but otherwise normal. Fluctuation was felt from a little behind the top of the auricle, 10cm. horizontally, and 8cm. vertically through the centre. There was no abnormality on the mastoid, but there had been a purulent otitis for four months. The pus must have taken the somewhat unusual way through the zygomatic cells. I opened the abscess in front of the auricle, liberating a great quantity of pus. Sounding with a probe revealed a smooth surface of the squamous. I stitched the wound loosely.

"Soon after, the upper part of the mastoid was tender, red, and swollen. I opened it: the antrum was large, and full of pus; I cleansed it. The convalescence has been without any unusual feature. I expect that by another week in the hospital he will be well."¹

Discussion: Dr. DUEL stated that he had had a similar case in an infant of three months, where the drum had not been ruptured.

Dr. DUEL presented **photographs** showing the possibility of correcting deformity of the auricle without removing the cartilage.

Dr. WILSON reports **two cases of facial paralysis**, the first

¹And so he was.

in a physician, aged sixty, who, after a long drive, developed a partial paralysis of the facial nerve. There was no evidence of involvement of the tympanic cavity. Recovery took place after five weeks under the use of electricity and strychnine. The second case was a woman of thirty, who, on March 29th, contracted a severe coryza, especially of the right nostril. Ten days later pain developed in the ear of the affected side, followed by a total paralysis. When seen by Dr. Wilson a week later, the pain had nearly disappeared. The drum membrane was red. No local treatment. Recovery took place in four weeks under electricity and strychnine. Fugitive facial paralysis without apparent involvement of tympanic cavity is common (Case I.). Subacute inflammation of tympanic cavity accompanied by facial paralysis is rare (Case II.).

Discussion: Dr. HASKIN reported a case of a soldier who had suffered from earache followed by total paralysis. The drum membrane was intact. There was a slight stricture of the Eustachian tube. Treatment of the tube. Recovery in four weeks.

Dr. GRUENING had seen a facial paralysis develop in a case of herpes zoster. The drum membrane was intact. Recovery took place upon the disappearance of the herpes.

Dr. GRUENING reported a case of combined **Bezold and extradural abscess**. A youth was brought into the hospital in an unconscious state with a temperature of 104° . A history of earache was elicited from the parents. Operation revealed a perforation of the mastoid tip and an abscess upon the dura above the upper knee of the sinus. The temperature fell at once after the operation, and the patient made an uneventful recovery.

Discussion: The CHAIRMAN stated that he had seen this combination on several occasions.

Dr. ARNOLD KNAPP inquired as to the duration of the ear disease, and thought that a Bezold abscess usually did not develop early in the course of the otitis.

Dr. GRUENING did not agree with this, and stated that he had frequently seen a Bezold abscess early in the course of acute ear disease.

Dr. GRUENING reported a case of **suspected sinus thrombosis where operation revealed nothing**. He had been asked to see an adult who was running a suspiciously zigzag temperature. The blood examination showed nothing characteristic.

The blood culture was negative. There was no evidence of ear disease, and no enlargement of the spleen or other abdominal organs. A spot of tenderness was present over the mastoid. The temperature rose to 106°. Operation showed nothing in the drum membrane, the antrum, or mastoid tip. The sinus was thoroughly exposed, but showed nothing. At the end of the operation a red spot was seen on the forehead, and erysipelas was suspected, but was excluded on the following day. The temperature fell, and the patient recovered.

Dr. BRYANT referred to a case of mastoid operation, followed in nine days by rise of temperature to 106° by the mouth, with fluctuations. The sinus was uncovered, and found thickened at the knee. It was opened, but no clot was found. The patient recovered rapidly.

Dr. GRUENING thought that such thickening was not pathological.

Dr. DUEL reported a case of extensive **double mastoiditis** occurring in the fourth week of **typhoid fever**. Both mastoids were necrotic, with perforations at the tips. At the time of operation both sinuses were found exposed and lying in granulations. Temperature of 100° at the time of operation. No history of chill. Uneventful recovery.

Discussion: The CHAIRMAN stated that in his experience granulations over the sinus usually indicated no clot existing in the sinus.

Dr. BRYANT reported two cases of **sigmoid sinus thrombosis**. The first case, a child of five, resulted favorably. The vein was ligated and opened, but not excised. The jugular bulb was opened along the route of the sinus. Pus was found in the sinus and vein. In the second case, a man of twenty-eight, the vein was not opened. The sinus was opened, and contained pus. There was no bleeding. Death ensued. In both cases, the bone, the meninges, and also the brain tissue adjacent to the knee were black and gangrenous. A dissection of the parts was presented, which showed the method of exposing the jugular bulb along the route of the sinus.

Dr. HASKIN was of the opinion that this method of opening the bulb was dangerous; while he recognized that if the sinus was followed down posteriorly the nerve need not be wounded, the proximity of the cervical vertebra rendered infection in this

locality very liable. He referred to two cases of torticollis following the mastoid operation in the practice of a colleague.

Dr. GRUENING thought the procedure a perfectly safe one in certain cases.

Dr. BRYANT reported his results in the use of the **blood clot in the radical operation**. The external wound was closed, except for the introduction of a small cigarette drain. Out of twenty-three cases done according to this method during the past year, three had become infected, and in these the healing did not seem to have been delayed on that account longer than in the non-infected cases. In all the others, the healing was greatly accelerated. In reply to a question by Dr. Dench, he said that he used no antiseptics in washing the wound, and made no plastic operation upon the canal wall.

Dr. GRUENING's results with the blood clot had been poor.

Dr. HASKIN had had a case recently of acute mastoiditis, where perfect healing after operation followed the primary closure of the wound by means of deep-buried silkworm-gut sutures.

Dr. DUEL raised the question of closing such wounds when the dura or sinus had been exposed, and was strongly opposed to this procedure.

Drs. GRUENING, SHEPPARD, and PHILLIPS agreed with him in this.

Dr. HARRIS reported a **case of facial erysipelas** developing after the mastoid operation, and inquired the experience of the gentlemen present in this respect, as well as to the extension of the erysipelas into the mastoid wound. The patient was a woman of twenty-eight, who had undergone a secondary operation. The entire operation had been performed under strict antiseptic precautions. A short time previously two septic cases had been operated upon in an adjoining operating room. The erysipelas developed on the second day following the operation. It proved quite mild in character, and did not extend into the mastoid wound. On account of the extensive exposure, he was for a time apprehensive of such a possibility.

Dr. PHILLIPS thought there was a possibility of mistaking erythema from iodoform gauze for erysipelas, and was confident that he had seen such mistakes made.

Dr. GRUENING thought that such a mistake should not occur. Erythema from iodoform gauze poisoning did not carry any temperature with it. Erysipelas always does. He reported one fatal

case of otitic erysipelas from his own practice. Here the sinus became thrombosed, and a cerebellar abscess developed. Immediately upon the diagnosis of the complication the case was removed to the isolation ward, and the other patients in the ward, five in number, were sent home. Four out of the five developed erysipelas. He believed, therefore, that erysipelas, where surgical cases were present, should be regarded as contagious.

Dr. TOEPLITZ reported a fatal case of erysipelas following radical operation on the fourth day. Death was due to leptomeningitis and a superficial abscess of the temporo-sphenoidal lobe.

Dr. ARNOLD KNAPP inquired as to the *possibility* of the *intra-cranial venous sinuses* being under certain conditions *temporarily empty*. He had recently observed, during the dressing of a mastoid wound, the sigmoid sinus apparently empty, without any evidences of thrombosis. The phenomenon of air aspiration followed, with all of the alarming symptoms. The patient recovered.

REPORT ON THE PROGRESS IN OTOTOLOGY DURING THE FOURTH QUARTER OF 1905.

BY PROF. ARTHUR HARTMANN, BERLIN.

Translated by Dr. ARNOLD KNAPP.

ANATOMY AND PHYSIOLOGY.

309. VERNIEUWE. **The development of the cochlea in mammals and in man.** *La presse otolaryngologique Belge*, Nos. 6 and 7.

310. ARULLANI and SEYRE. **On the relation between the nose and blood-pressure.** *Archivio it. di otologia*, etc., vol. xvii., No. 1.

311. GRADENIGO. **On the innervation of the soft palate.** *Archivio it. di otologia*, etc., vol. xvii., No. 1.

312. URBANTSCHITSCH. **On the sensations of the special senses and memory pictures.** *Arch. f. die ges. Physiologie*, vol. 110.

309. VERNIEUWE. *The development of the cochlea in mammals and in man.*

The embryonal development of the vertebrate cochlea proceeds from the base to the apex.

In the formation of the scalæ, the scala tympani is first formed by the union of young intracapsular connective tissue, with progressive atrophy of the cytoplasmic and nuclear elements, accompanied by an active congestion.

Both columns and the external acoustic cells are developed from the small Koelliker's ridge, while the internal auditory cell is developed from the large epithelial ridge.

The two columns are formed from two distinctly different cells, whose nuclei become differentiated in early life. These two elements correspond to the innermost cells of the smallest ridge.

The large ridge consists of numerous layers of cells. On its surface the membrane of Corti first appears. This is a cuticular structure.

The epithelial elements of the habenula sulcata, resembling Reissner's membrane, are transformed epithelia of the primitive cochlear canal. At the summit of the habenula sulcata this epithelium is to be recognized only as a row of nuclei, which are surrounded by a pale cytoplasmic zone and separated from one another by connective tissue. The separating framework is transformed connective tissue, and originates in the young intracapsular connective tissue, which at one time completely surrounds the cochlear canal.

BRANDT.

310. ARULLANI and SEYRE. *On the relation between the nose and blood-pressure.*

From experiments on normal and pathological noses, the authors found that an irritation of the nasal mucosa by energetic massage or galvano-cautery increases the blood-pressure. All pathological conditions of the nose which interfere with expiration can increase the blood-pressure transiently or permanently.

RIMINI.

311. GRADENIGO. *On the innervation of the soft palate.*

The author agrees with the view expressed by Rethi and Ler-moyez, that the soft palate is not innervated by the facial nerve but by the vagus.

The following case supports this view. In a patient suffering from chronic purulent otitis, during an operation for sinus thrombosis an extensive collection of pus was found in the jugular bulb. Complete paralysis of the right vocal cord and of the right half of the soft palate occurred, with slight involvement of the hypoglossus, as shown by a deviation of the tongue to the left side. The sterno-cleido-mastoid and trapezius muscles were paralyzed. No facial paralysis. Gradenigo believes that the suppuration in the bulb caused a compression of the nerves as they passed through the jugular foramen.

RIMINI.

312. URBANTSCHITSCH. *On the sensations of the special senses and memory pictures.*

This author brings observations on after-perceptions, on the localization of the various sensations with especial regard to the sense of temperature, and on acoustic and optic memory pictures.

The acoustic after-perceptions are sometimes qualitatively different from the inciting tone, in some cases higher. The difference in tone may be limited to certain groups and be of the

same extent for various tones. These tone differences can easily be recognized if, during the after-perception, the objective tone can be also perceived. By aid of two tuning-fork tones, of which one corresponds to the subjective and the other to the objective tone, the difference can be exactly estimated.

In the case of two tones differing by a number of vibrations, the vibrations can be distinctly recognized by the ear, but a simultaneous action of both subjective and objective tones causes no difference in vibrations.

The weak overtones of the fundamental tone usually are not perceived in the after-sensation, so that the tone produced by the harmonica and by the tuning-fork may produce the same after-sensation. Acoustic memory pictures occur sometimes in hallucinatory distinctness.

Striking examples of auditory memory pictures of different persons are the following: the correctness of wrongly perceived auditory impressions, the gradual formation of a sentence with retarded comprehension of a sentence which was not understood, and the subsequent comprehension of a sentence of which at first not a single word was correctly understood. BRUEHL.

GENERAL.

a.—GENERAL PATHOLOGY.

313. ZILLIACUS. Disturbances of hearing in railway employees. *Finska läkaresällsk. handl.*, 1905, No. 50.

314. BRUEHL. Examinations of the hearing and anatomical conditions found present in progressive deafness. *Berliner klin. Wochenschr.*, 1905, No. 50.

313. ZILLIACUS. *Disturbances of hearing in railway employees.*

In 1885–6, 124 employees were examined and 286 in 1902, of whom 94 were examined for the first time. Of 227 guards and brakemen, 35.2 % had normal hearing, 42.2 % showed a distinct diminution, and 22.2 % presented a moderate loss of hearing. If these are graded according to the years of service, it is seen that after five years of service not one-half possess normal hearing, after 25–36 years not one-quarter, while marked disturbances of hearing are very much increased. Of the engine-drivers 29.5 % had normal hearing, 40.9 % a decided and 29.5 % a moderate diminution of hearing. The number of normal hearing after 5 years' service is 45.1 %, while after 15 years not one possessed normal hearing, and the marked disturbances of hearing had

increased very much. After 35 years there was but one who had only a moderate degree of disturbance in hearing.

In comparison 249 prisoners were examined, and it was found that if these were arranged in groups and compared to the railroad employees the diminution in hearing in both classes remains the same. In some the railroad employees even seem to hear better. The author, therefore, believes that service on the railroad has no particularly injurious effect on the hearing. He concludes that normal hearing is not necessary, inasmuch as the auditory signals used can be easily heard, even by persons with reduced hearing.

MOELLER.

314. BRUEHL. *Examination of the hearing and anatomical conditions found present in progressive deafness.*

This is a short description of the various forms of progressive deafness, and their diagnosis by aid of tuning-forks and their pathological anatomy.

MUELLER.

b.—METHODS OF EXAMINATION AND TREATMENT

315. QUIX. *The forms of vibrations of a forked and bent rod, of tuning-forks, and of the handle of the tuning-fork.* *Physiol. Labor. der Utrechter Hoogeschool*, vi., 1905.

316. BACHAUER. *Progress in the treatment of ear diseases.* *Deutsche med. Wochenschr.*, No. 49, 1905.

317. BERGH. *On massage of the mucous membrane in certain ear diseases.* *Norsk mag. f. læg.*, 1905, p. 1259.

318. BRAUN. *On some new local anæsthetics* (stovain, alypin, and novocain). *Deutsche med. Wochenschr.*, 1905.

319. SPEISS. *The advantage of negative pressure in the treatment of dry atrophic catarrh of the nose and throat.* *Arch. f. Laryngol.*, vol. xvii., 2, 1905.

320. PRYM. *On the treatment of inflammatory diseases of the tonsils with the suction apparatus.* *Münchener med. Wochenschr.*, No. 48, 1905.

321. HONNETH. *On the value of Sondermann's suction apparatus in the diagnosis and treatment of diseases of the nose.* *Münchener med. Wochenschr.*, No. 48, 1905.

322. KIRSCHNER. *Paraffin injections in the human tissues.* *Virchow's Arch.*, vol. i., 82.

323. UHTHOFF. *On injuries of the eye after paraffin injections in deformities of the nose.* *Berliner klin. Wochenschr.*, No. 47, 1905.

315. QUIX. *The forms of vibrations of a forked and bent rod, of tuning-forks, and of the handle of the tuning-fork.*

From experimental and theoretic observations on the forms of

vibrations of a tuning-fork the author comes to the following conclusions :

1. The handle of a tuning-fork complicates the tuning-fork by the addition of new forms of vibrations which vary with the method by which the fork is held and the pitch.

2. Following this complication the tuning-fork cannot be regarded as a source of sound which will always produce the same effect. In the case of a tuning-fork it is very difficult to perceive a tone with an exactly similar clang-tint and intensity in the physical sense.

3. The previously observed transverse vibrations of the handle of the fork are all rod tones as has just been described.

4. Forced transverse vibrations of the handle of the fork are very rarely of the same pitch as the true tones of the tuning-fork.

5. The longitudinal movement of the handle in the ordinary tuning-forks may be regarded as a mass movement.

BRUEHL.

316. BACHAUER. *Progress in the treatment of ear diseases.*

This paper describes certain methods of treatment which are practised in the Munich University Ear Polyclinic (Prof. Haug). The treatment in furunculosis of the canal has become more conservative and incisions are avoided if possible. Gauze saturated with acetate of aluminium is introduced into the canal. When there is considerable pain a gauze soaked in a 3-10 % alcohol solution of anæsthesin is used.

To anæsthetize the canal for small operations the methods of Laval and von Eiken are recommended. These consist in injecting the solution of cocain subcutaneously near the ear canal. Laval makes two injections, one in front of the tragus and the other behind the auricle, while von Eiken makes one injection behind the auricle directly underneath the cartilage of the floor of the canal. The latter author has been able to anæsthetize the middle ear by bringing cocain into the attic through the previously anæsthetized Shrapnell's membrane. This method has been satisfactory in the extraction of the hammer and anvil.

The suction treatment of Sondermann was also tried in order to see how thoroughly the discharge could be removed in purulent otitis, and the author seems to have been well satisfied with this method.

A decided advance is the method recommended by Politzer

and others of filling the operative wound after the mastoid operation with paraffin.

Finally the method of Bier is spoken of where by congestive hyperæmia in acute inflammations of the ear in many cases operations have been avoided.

317. BERGH. *On massage of the mucous membrane in certain ear diseases.*

The excellent effect of massage was shown in a case of ethmoiditis with secondary ear disease where the mucous membrane was massaged with a probe, the remnants of polypi disappeared, the air passages were restored, and the tinnitus relieved. Massage of the nose and naso-pharynx was attempted without good result in various diseases of the ear.

MOELLER.

318. BRAUN. *On some new local anæsthetics* (stovain, alypin, and novocain).

Stovain is not applicable to the nose and larynx because it makes the mucous membrane too hyperæmic and is too irritating. Alypin is as suited for tissue injections as stovain. The application of a 10% solution is just as anæsthetic to the mucous membrane as a corresponding solution of cocain except that the alypin is less poisonous. Novocain is an anæsthetic of almost ideal freedom from irritation. Even a 10% solution injected under the skin produces no reaction. When combined with suprarenin it is a very powerful anæsthetic. Its solutions, moreover, are permanent and can be sterilized by boiling. For the nose and larynx a 10% solution is recommended, with the addition of three drops of a $\frac{1}{1000}$ suprarenin solution.

NOLTENIUS.

319. SPIESS. *The advantage of negative pressure in the treatment of dry atrophic catarrh of the nose and throat.*

The author believes that negative air-pressure causes an increased congestion of the mucous membrane and thereby incites activity of the glands and prevents atrophy of the mucous elements. When persistently applied he believes it has produced permanent results in atrophic processes. It is of diagnostic importance in nasal suppurations and in the treatment of acute infections. The somewhat complicated apparatus consists of an electric air-pump with various appliances for the nose and throat.

ZARNIKO.

320. PRYM. *On the treatment of inflammatory diseases of the tonsils with the suction apparatus.*

The suction therapy brought amelioration of the symptoms without any harm. Hypertrophy of the tonsils was not influenced.

SCHEIBE.

321. HONNETH. *On the value of Sondermann's suction apparatus in the diagnosis and treatment of diseases of the nose.*

In Eschweiler's polyclinic the suction apparatus is warmly recommended in the diagnosis of nasal accessory empyemata. As to its therapeutic advantage the author is sceptical, and was not able to obtain any improvement in chronic suppurations. From an experiment on the cadaver he thinks it is possible to aspirate the antrum of Highmore completely. The reviewer does not think this can be physically possible, because in man the increase of the suppuration is influenced by the negative pressure.

SCHEIBE.

322. KIRSCHNER. *Paraffin injections in the human tissues.*

It has been generally accepted that injected paraffin heals at the place of injection and remains in a permanent condition. The author has examined a number of cases. The first case was one in which soft paraffin had been injected into the nose of a man. Two and a half years after the injection a gradual progressive inflammation set in which increased and extended to the forehead. In two operations it was possible to remove the greater part of this cartilaginous swelling. Microscopic examination of the excised piece of tissue showed that **the injected soft paraffin had been completely absorbed, and from an irritation in the surrounding tissues had led to a severe destruction of tissue—namely, chronic inflammation with necrosis.**

The interesting histological details must be read in the original paper.

Hard paraffin of a high-melting point is also absorbed, which process is very much facilitated by the peculiar lack of density of the paraffin. Five specimens from various parts of the body, which had remained one and one-half years in place and then had to be removed on account of local disturbance, showed distinctly the various stages of this process of absorption. The conclusions are as follows:

The paraffin injected for the correction of deformities, whether soft or hard, is not successful, because the connective tissue organization does not cease at any given moment, but continues indefinitely, and finally results in the complete absorption of the

paraffin. Moreover, both forms of paraffin cannot be injected in certain parts of the body, because they are not well borne and cause severe local disturbance requiring early removal.

If these observations of Kirschner's are confirmed, the use of paraffin will have to be abandoned. Owing to the importance of the question it seems desirable that all observations should be published. A case of my own which resembles the first one in this paper could not be reported because the specimen was unfortunately lost.¹

HOELSCHER.

323. UHTHOFF. *On injuries of the eye after paraffin injections in deformities of the nose.*

The first case, a woman, forty-five years of age, on the third injection of paraffin (boiling-point 43° , injection at $46-47^{\circ}$) became suddenly blind in the left eye from embolism of the central retinal artery. Uththoff believes that the embolism was caused by a particle of the paraffin which passed through the pulmonary circulation in fluid condition.

The second case, a man, fifty-seven years of age. Two months after the injection of paraffin, suddenly a painful swelling of the eyelids appeared, which led to a permanent thickening of the lids and complete closure of both palpebral fissures. Four months later the opening of the lids was made possible by removing large pieces of a hard tumor-like tissue from the eyelids, leaving a decided deformity. Microscopic examination showed that in the tumor-like masses the tissue was infiltrated with paraffin, and there was intervening inflammatory proliferation (giant cells).¹

MUELLER.

c.—DEAFMUTISM.

324. LINDT. *On the pathology of congenital deafmutism.* *Deutsches Arch. f. klin. Med.*, vol. lxxxvi.

This is a histological description of the temporal bones of a deaf-mute who was not examined during life, and the principal changes found in the labyrinths.

The external and middle ears were normal.

The labyrinth capsule was normal, with the exception of a

¹ The Editor was asked a few months ago to remove the paraffin which had been infiltrated into the subcutaneous layer of the lower lid of a young man, to facilitate the extirpation of the lachrymal sac into which it had been injected. I found the sac as usual, but the lower eyelid was thickened, somewhat nodular, and hard. I refused; having no experience with paraffin. The doctor might perhaps get it out if he heated the eyelid so that the paraffin, made liquid, could sicker out through some incisions made into the skin.—H. K.

small otosclerotic focus in the bone on the right side. The entire bony labyrinth was of normal proportion.

The spiral ganglion was atrophic.

There was atrophy of the cochlear nerve in the trunk, and especially marked in the fibres in the cochlea.

The saccular branch was atrophic. There was normal development of the ramus utriculo-ampullaris and ampullaris posterior. Marked degeneration of the epithelium, especially of the neuro-epithelium of the inferior part of the membranous labyrinth, of the cochlea, and of the saccule. Normal development of the superior part of the membranous labyrinth, of the utricle, and of the semicircular canal with their nerve terminals.

The fibres of the cochlear nerve presented an abnormal picture owing to post-mortal and artificial changes. BRUEHL.

EXTERNAL EAR.

325. RAOULT. *Tuberculosis of the lobule of the ear in the form of eczema.* *La presse otolaryngologique Belge*, No. 9, 1905.

326. FORSELLES. *Acquired atresia of the external auditory canal.* *Helsingfors*, 1905, p. 45.

325. RAOULT. *Tuberculosis of the lobule of the ear in the form of eczema.*

This case of tuberculosis seemed at first to be an eczema of the auricle, which began two years ago, after the bite of a fly. The patient was a boy thirteen years of age. The tumor was decreased in size from ignipuncture, then after a year the auricle had enlarged enormously, the skin became infiltrated and covered with many red ulcerating nodules. The diagnosis lay between tuberculosis and actinomycosis until the histological examination showed the tuberculous nature. Characteristic were the slow development (five years), the many tuberculous nodules, the softness of the tissue resembling a lipoma or angioma, the serous discharge, and the formation of scales. BRANDT.

326. FORSELLES. *Acquired atresia of the external auditory canal.*

Fifty-two cases were collected from literature, to which are added three of traumatic origin. In one of these a plastic operation was successfully performed. MOELLER.

MIDDLE EAR.

a.—ACUTE OTITIS MEDIA.

327. KEPPLER. *On the treatment of inflammatory conditions of the*

head and face with congestive hyperæmia. *Münchener med. Wochenschr.*, No. 45, 1905.

328. SOKOLOV. **A case of hemorrhage from the internal carotid artery in acute purulent otitis media.** *Medizinskoje Obosrenje*, No. 16, 1905.

329. SPRAGUE. **Scarlatinous otitis.** *Arch. internat. d'otol.*, etc., No. 6, 1905.

330. DAAE. **Primary diphtheria of the ear.** *Norsk mag. f. læg.*, p. 987, 1905.

327. KEPPLER. *On the treatment of inflammatory conditions of the head and face with congestive hyperæmia.*

The part on the ear in this paper is almost a verbal copy of the article published in this periodical. The results of Heine (see report of the last meeting of the German Otological Society), where nineteen cases had to be operated upon, are regarded by the author as not at all bad.

A new case from Bier's clinic is extensively reported. In a child, one and one-half years of age, suffering from otorrhœa for one week, there was a large perforation in the drumhead with exfoliation of the necrotic hammer and a gravitation-abscess. The abscess was incised, and congestion was applied. After one and one-half months, healing took place, with arrest of the discharge, and later with closure of the drumhead. A favorable case of subperiosteal abscess behind the auricle is also reported.

Bier has applied congestion for years in meningitis, however, in pronounced cases without any result. In a recent case healing took place, in which, on the third day after the radical operation, there were vomiting, headache, loud cries, apathy, fever (39.4°). inequality of pulse, rigidity of neck, and cutaneous hyperæsthesia, Lumbar puncture was not performed.

SCHEIBE.

328. SOKOLOV. *A case of hemorrhage from the internal carotid artery in acute purulent otitis media.*

The carious process produced extensive destruction of the petrous bone and eroded the carotid artery. As a result there were repeated hemorrhages, with fatal issue on the eleventh day.

SACHER.

329. SPRAGUE. *Scarlatinous otitis.*

The ears of 60 scarlet-fever patients were examined, and in 10 cases there was a purulent otitis. In 7 it was bilateral, in 3 on only one side. In 2 of the cases mastoiditis developed. In 5 the hearing returned to normal; in 2, not-

withstanding proper treatment, chronic otitis developed; in the other 3 cases the results were not to be determined. Clinically, the author regards the varieties of otitis occurring in scarlet fever as falling into three classes: acute serous, acute purulent, and acute gangrenous otitis. Regarding paracentesis, he occupies an extreme standpoint, stating that we should not wait until the ear discharges; this waiting is a disastrous neglect. As soon as the drumhead shows the slightest sign of an inflammation, or there is exudate in the tympanum, a paracentesis must be immediately undertaken. OPPIKOFER.

330. DAAE. *Primary diphtheria of the ear.*

A boy eleven years of age had suffered from pain in his right ear for several days. The drum was red, the mastoid area tender. On paracentesis a moderate amount of serous, sanguinolent fluid, with a few grayish-white threads, was liberated. After a few days the depth of the canal was filled with whitish membranes. Culture revealed diphtheria bacilli. The mucosa in the nose and throat showed only cocci. After ten days deposits appeared on the tonsils. As the rise in temperature and tenderness continued, the mastoid operation was undertaken. The cells contained pus and pseudo-membranes. A few days later there were a failure of vision of the right eye and a pulmonary embolus, so that, presumably, a sinus thrombosis had occurred. Ultimate recovery. MOELLER.

b.—CHRONIC PURULENT OTITIS.

331. SLATOWEROW. *Caries of the hammer and anvil and their operative removal.* *Russki Wratsch*, 1905, No. 20.

332. GUISEZ. *Recovery of a case of mental confusion by the radical cure of a double purulent otitis.* *La presse otolaryngologique Belge*, 1905, p. 10.

333. VEDOVA. *Modern views on suppurations of the labyrinth.* *La pratica oto-rino-laringoiatrica*, 1905, No. 6.

331. SLATOWEROW. *Caries of the hammer and anvil and their operative removal.*

The results of operation on 28 cases are published. Of these 19 recovered, 7 are unfinished, in 4 the purulent discharge changed to a mucoid, and in one finally the radical operation had to be undertaken. Of those that recovered, in 15 a distinct improvement of hearing took place, while in the others the hearing

remained the same. Based on these observations, the author believes that the removal of the carious ossicles, notwithstanding its great technical difficulties, should receive due consideration.

SACHER.

332. GUISEZ. *Recovery of a case of mental confusion by the radical cure of a double purulent otitis.*

During the examination of a young girl in whom a condition of stupor alternated with periods of excitement, and who refused nourishment, suffering from hallucinations of sight, smell, and taste, and from ideas of persecution, a double-sided purulent otitis after scarlet fever was found present. Suitable treatment and an operation on the right side relieved the physical condition. The case is reported because the author believes that the aural lesion suffices in those with hereditary and neuropathic tendencies to awake the slumbering disposition to mental disease.

BRANDT.

333. VEDOVA. *Modern views on the suppuration of the labyrinth.*

This is a review of the important articles which have recently appeared on the diagnosis and operative treatment of labyrinth suppurations. The literary references are complete. RIMINI.

c.—CEREBRAL COMPLICATIONS.

334. MENDES. *An extradural abscess of otitic origin.* *Archivio italiano di otologia*, etc., vol. xvii., No. 2.

335. DELSAUX. *Otitic meningitis treated by an extensive resection of the skull; death, autopsy, report.* *La presse otolaryngologique Belge*, 1905, No. 12.

336. UCHERMANN. *Otitic pyæmia and infectious sinus thrombosis* *Norsk mag. s. læg.*, 1905, p. 913.

337. GUNNAR. *A remarkable case of otitic pyæmia.* *Hygeia*, 1905, p. 1182.

338. STENGER. *On otitic pyæmia.* *Medizinische Klinik*, 1905, No. 28.

334. MENDES. *An extradural abscess of otitic origin.*

This is a complete description of a case of extradural perisinuous abscess, with conditions found at operation, and remarks.

RIMINI.

335. DELSAUX. *Otitic meningitis treated by an extensive resection of the skull; death, autopsy, report.*

This case is remarkable on account of the extended period of the meningeal process, which only on the last days invaded the

base of the brain. Local signs of a meningitis were entirely absent, and examination of the eye-grounds was negative. Lumbar puncture proved to be valuable not only from the diagnostic but also from a therapeutic point of view. BRANDT.

336. UCHERMANN. *Otitic pyæmia and infectious sinus thrombosis.*

The author distinguishes between otitic pyæmia (where there is no thrombosis) and otitic infectious sinus thrombosis. The first form coincides with Koerner's osteophlebitis pyæmia. In 6085 autopsies performed in the main hospital in Christiania, from 1865 to 1902, there were 21 cases of sinus phlebitis. Of these, 18 were of otitic origin. From 1891 to the conclusion of 1904, 30 cases of otitic pyæmia and infectious sinus thrombosis were treated in the Ear Clinic; in 20 cases males, in 10 females. Ten were right-sided, 18 left-sided, and 2 bilateral. In 18 of the 25 the inflammation in the mastoid process extended directly to the sinus wall, and in 6 there was a perisinuous abscess; in 7 there was, microscopically, no connection. In the 5 cases of simple pyæmia there was no direct connection between the focus in the mastoid process and the sinus wall.

Of the 5 cases of otitic pyæmia, 3 were uncomplicated and followed an acute suppuration. They all got well. One case of chronic suppuration and one after a labyrinth-suppuration were examined at autopsy, but no sinus thrombosis was found present. Among the infectious sinus thromboses, 5 occurring after an acute suppuration recovered, whereas of the remaining 20, 10 died. One case was complicated by meningitis, one by cerebral abscess. One case was interesting on account of the presence of a large occipital abscess. A few days after operation a large amount of foetid pus was discharged from the nose and mouth, presumably coming from the sphenoidal sinus. The autopsy, however, showed that the suboccipital abscess had perforated into the pharynx.

The symptoms and the course of treatment are then taken up. In order to prevent pyæmia the author makes it a rule, when, in an acute suppuration, notwithstanding a large perforation of the drum, fever persists for eight days, to open the mastoid process. If the slightest sign of a cerebral complication is present, the sinus wall must be exposed, even if the intervening bone seems healthy. The metastatic abscess must be opened and irrigated.

As to the physical signs of a thrombus, pulsation of the sinus is without value. A sinus is only present with certainty when there is a firm band, or when there is a fistula in the sinus wall, or when the sinus wall is depressed so that there is a free space between the wall and the bone. It is best not to make a diagnostic puncture. If there is no disintegration in the sinus the sinus wall need not be evacuated, and the result of the primary operation observed. In the presence of emboli, or when the jugular vein is inflamed, the ligation takes place preferably above the facial vein.

MOELLER.

337. GUNNAR. *A remarkable case of otitic pyæmia.*

The patient suffered from right-sided acute otitis with serous exudate and choked disk. Three days later the middle cranial fossa was exposed. There was no pus in the mastoid process. At the region of the knee the sinus was hard. In the sinus there was a thrombus with disintegration corresponding to the discolored area. Continuous temperature and a poor general condition led to a ligation of the jugular vein two days later. Various metastatic suppurations occurred, of which one, an arthritis of the humerus, necessitated resection of the joint. Recovery.

MOELLER.

338. STENGER. *On otitic pyæmia.*

An acute suppuration of the ear (staphylococci), running a mild course after the onset of a new attack of angina (streptococci), presented a mastoiditis with severe inflammatory and general symptoms, and joint metastases rapidly developed. At the mastoid operation (streptococci pus) the sinus was found healthy. The joint metastases and the septic symptoms seemed to be produced by a bulb thrombosis, so that the jugular was ligated and the bulb exposed, which proved to be healthy. On opening the knee-joint it showed pus with streptococci. Slow recovery of the other joint affections during treatment with Cr  d  's ointment.

The disease of the mastoid process in this case was not the origin of the general infection but only an intermediate member. The case shows that not necessarily every py  mia occurring in the course of an acute otitis is the result of an ear disease. Under the circumstances it would have been better to have selected a different title, because the case which has been reported is not one of otitic py  mia.

HOELSCHER.

d.—OTHER MIDDLE-EAR DISEASES.

339. GOERKE. Exudations and plastic processes in the middle ear. *A. f. O.*, vol. lxx., p. 226.

340. Urbantschitsch. The treatment of chronic middle-ear catarrh. *Deutsche med. Wochenschr.*, Nos. xlvii., and xlviii., 1905.

339. GOERKE. *Exudations and plastic processes in the middle ear.*

These investigations on the inflammations of the middle ear with intact drum are based on about 2000 autopsies. In the autopsies of adults exudates were very frequently found in the middle ear which had given no signs during life and which proved histologically to be inflammatory exudates exactly like those found in nurslings. After a description of the normal anatomy of the mucous membrane, including a discussion of the presence of glands in the tympanic mucosa and a description of the embryonal mucous tissue and a description of the processes in its disappearance, the pathological conditions in the mucous membrane are described. The infiltration is most marked underneath the mucous membrane, less in the antrum and mastoid cells than in the tympanum. Circumscribed foci of infiltration were found chiefly in the promontory wall and in the drum. Exudates were found principally in the tympanum and in the mastoid cells, rarely and to a slight degree only in the tube. The sites of predilection were the windows, the posterior pocket of the drum membrane, the tympanic floor, the space between the ossicles, the ligaments and the drum and especially Prussak's space. The changes which the exudate undergoes as it becomes organized are extremely interesting. Granulation tissue appears in those parts of the mucous membrane where the epithelium is absent, and vessels develop from the granulation tissue into the exudate, thus forming the cavity proliferations of Preysing, which, according to the author, have nothing to do with the disappearance of the embryonal tissue, but are also found in the organization of the exudate in adults. Absorption of the bone was observed in only very few cases, and then only in the mastoid cells. The formation of new bone is a frequent condition also, chiefly in the mastoid processes.

This form of acute exudative otitis is found in most forms of death from acute or chronic disease. The individual is always weakly and decrepid, in whom the lack of resistance on the part

of the tissue favors the onset of the otitis. This otitis is therefore described as the otitis of the hectic, and the author thinks it incorrect to differentiate the otitis media of the sucklings as a particular condition. Under this title there are many otitides which have been regarded as specific forms of otitis in the various infectious diseases. The extremely striking frequency of this condition in children is explained by the relatively poor physical conditions of the children in the hospitals.

From a pathologic standpoint, acute otitis, according to the author, should be characterized as otitis media exudativa, plastica, and necroticans.

HAENEL.

340. This lecture, designed for the practising physician, treats of such methods as: the air douche, the introduction of fluids and vapors into the middle ear, the introduction of the bougie into the tubal canal, massage, electricity, and certain operations; and finally the various diseases of the nose and naso-pharynx and the general condition of the body.

The author recommends the introduction of the bougie into the tube because this method gives admirable results, especially in the hypertrophic forms. The various forms of massage are less favorably spoken of. He has also used with advantage electricity, especially the galvanic current. Operations like the division of adhesions, tenotomy of the tensor tympani and of the stapedius muscle, extraction of the ossicles, and mobilization of the stapes are not described as they do not apply to the general physician. The methodical hearing-exercises are scarcely mentioned. The article concludes with a description of the affections of the nose and throat and the treatment of the general health which are of such great importance in these conditions.

NOLTENIUS.

ARCHIVES OF OTOTOLOGY.

A CASE OF BILATERAL CEREBRAL DISTURBANCE OF HEARING WITH APHASIA.

BY DR. GEORGE BOENNINGHAUS, Breslau.

Translated from *Zeitschr. f. Ohrenhkl.*, Vol. XLIX., 1905, German Edition of these ARCHIVES.

A PATIENT forty-five years of age was suddenly taken ill in 1902 while enjoying perfect health. During a walk he suddenly experienced a peculiar sensation in his body, the ground seemed to sway, and he hurried home in extreme fear. There it was at first supposed that he had gone insane. The physician determined that the man was mentally sound but had become totally deaf so that he did not perceive even the loudest noise. In addition he had lost the power of speech and was able to make only unintelligible sounds. In the absence of symptoms of paralysis, especially of the tongue and of the face, the right diagnosis was immediately made, apoplexy of the hearing and speech centres. In the following weeks the speech improved, until to-day he can be understood, though with difficulty. He is apt to make mistakes, repeats words, employs false vowels, and is very apt to forget syllables. Reading is performed in the same way. Writing is very much less disturbed, while copying is unaffected.

The hearing began to improve after two months. To-day each ear is able to hear the conversational voice. He does not perceive the tick of his watch, but perceives the winding of the watch. Crepitation of paper is heard; writing on a slate, the jangling of keys, the clapping of hands, whistling, the bells of the electric tram, are all heard, though feebler by the left ear than the right. The tone series is not heard on the right side below H, while it is heard until a¹ on the

left side. The upper part is heard by both ears without any defects. Bone-conduction is lost. The drum-head and middle ear are unaffected.

Notwithstanding this relatively good hearing, the patient does not understand anything. Whether he is spoken to or one whistles, whether the hands are clapped, the tuning-forks vibrated, the door bell rings, or a dog barks—all these produce the same unintelligible noise. Naturally he has no understanding for music. He is unable to designate the number of syllables in a word or to tell the beat of music. The intellect is fully preserved. The man is educated and has always been well acquainted with what is going on in the world. On account of this defect in hearing and in speaking it is, of course, impossible for him to associate among strangers.

As regards the disturbance of speech the patient evidently suffers from sensory aphasia—that is, psychic deafness associated with paraphasia. Wernicke has told us of the seat of this disease. It is situated in the area of the left first temporal convolution. In man this is the centre of sound memories, and the impulse passes from this point to the motor speech centre of Broca in the left third frontal convolution, which in turn causes the speaking muscles to receive the proper innervation in order to perform their complicated functions. Therefore in diseases of the sensory speech centre, not only is the understanding for speech affected, but the speaking is incorrect. Presumably the focus has left a part of the speech centre uninvaded, because the patient is still able to speak—a cortical focus. The focus must, however, extend to the medullary radiation which passes to the sensory speech centre, because conduction from the ears to the preserved part of the sensory speech centre is interrupted—a sub-cortical focus. This combination of affected areas is the usual one in aphasia (Sachs).

The disturbance of hearing, of course, is of greater interest to us than the disturbance of speech. The patient became totally deaf for two months in both ears after an apoplexy in the left temporal lobe. How can this be explained? I

think as follows: In 1897, seven years ago, five years preceding this apoplectic insult, the patient suffered from a stroke of apoplexy. The left half of the body was completely paralyzed for two hours, though the function returned after a few days. A remnant of the paralysis persists in a slight drooping of the left angle of the mouth. The left half of the body was then completely anæsthetic and even to-day objects are perceived with difficulty by the left hand and only after prolonged palpation, while the right hand is normal. The prick of a needle is not perceived on the left side as painful. The apoplectic lesion must have been situated in the right internal capsule, though it is impossible to say how far it extended in the medullary radiation and into the temporal lobe. The motor tract was affected by distant action because the paralysis rapidly disappeared. The main lesion was in the sensory tract. In this the tract for the sensations of the skin was only permanently damaged in part. The right auditory tract must have been completely destroyed, because this explains that after the second apoplexy the patient was totally deaf for two months. This is also made probable because after the second apoplectic insult the sensory speech centre and the entire left temporal lobe were rendered functionless by distant action. The partial reappearance of hearing can be explained because the left temporal lobe recovered on the establishment of the collateral circulation. The apoplectic lesion must to-day be limited to a part of the sensory speech centre and to a part of the rest of the left temporal lobe, which, just as the right, simply serves for purely physical hearing.

This case is, therefore, an addition to the few reported cases of focal disease of both temporal lobes and of both auditory tracts. I was able to find only four similar cases in literature. These are the cases of Wernicke and Friedländer, Kahler and Pick, Shaw and Mills, collected by Bastian.

Our case is, however, of value from another point, because it seems to support the view that the auditory nerve of each side is in connection with both temporal lobes, and that means that the auditory nerve, like the optic nerve, only partially decussates. The proof for a total decussation has

been furnished by the physiological experiment on the auditory nerve in the dog. Munk has destroyed the right temporal lobe and the right labyrinth in the dog. The dog thereupon became totally deaf. This can only be explained by assuming a complete crossing of the auditory nerve in the dog, for if the decussation was only partial, the experiment would have destroyed the connection between the right temporal lobe and the left ear, and the left temporal lobe and the right ear. It would also have been lost by destruction of the connection between the right labyrinth and the left temporal lobe. The undivided connection of the left temporal lobe with the left ear would have remained intact, and the dog would not have been perfectly deaf. An observation of Kaufmann's is cited to prove the total decussation in man. A woman seventy-nine years of age suffered from an apoplexy, and thereafter could not hear the watch on the opposite ear. The aural examination is, however, so incomplete that this case cannot be regarded as conclusive.

As a proof for the partial decussation in man we have, first of all, the anatomic course of the auditory tract. It is known that the cochlear nerve, when it has reached the ventral auditory nucleus in the medulla oblongata, in great part crosses the middle line to approach the upper olive on the opposite side, the crossed posterior corpora quadrigemina, and then passing through the internal capsule and medullary radiation to the temporal lobe of the opposite side. We also know that from the ventral auditory nucleus a small part of the auditory nerve passes on to the uncrossed upper olive. The continuation from here to the uncrossed posterior corpora quadrigemina has been proven, though only very few fibres have been discovered in this region. A further proof is furnished by the fact that a man, though he only understands words which he hears by his left temporal lobe, nevertheless hears speech with both ears. In other words, the left temporal lobe is in connection with both ears. It may, however, be objected that this does not show a direct communication of the left ear with the left temporal lobe, because the connection of the left ear with the left tem-

poral lobe might take place from the left or right temporal lobe commissural fibres through the corpus striatum to the left temporal lobe. Our case seems to prove that the left ear is in direct communication with the left temporal lobe so far as a clinical observation can be of value. It is certain that the communication of the left ear with the right temporal lobe in our patient has been permanently destroyed. The patient must, therefore, if his auditory nerve had totally decussated, have been completely deaf in the left ear since 1897. But this is not the case, because he still has considerable hearing with that ear. It is unquestionably poorer than in the right side. This is explained because the left temporal lobe, which is alone suited for hearing, is in a weaker anatomic relation with the left ear than with the right.

Our case has shown that an important centre in the brain may have been completely destroyed without causing permanent symptoms of its defect. Our patient was very intelligent, and after the first apoplectic lesion, which injured the right temporal lobe, did not observe any diminution of the hearing, whether on one side or the other. This is probably correct, for both ears were connected with the left temporal lobe. But when the hearing on the left side was diminished, this does not need to have been so marked as to have been noticed by the patient, and those surrounding him. As an analogy for this remarkable condition, we look in vain for a lesion in the visual centres, because the hemianopsia which appears after a lesion in the visual centre is immediately noticed by the patient. But pseudo-bulbar paralysis furnishes us with an analogy, a disease which is produced by a bilateral lesion of the third frontal convolution and the surrounding parts of the central convolution, namely, the centres which innervate the speaking muscles.

If an apoplectic lesion occurs in the right motor speech centres, the left angle of the mouth will droop for a short time, but then there is no defect visible, because the left centre, on account of its bilateral distribution to the speech muscles, can serve both sides. If, however, the patient

should later suffer from another lesion in the left speech centre, then the entire speech muscles are paralyzed, as occurs gradually in the later stages of the true chronic bulbar paralysis.

ON THE SO-CALLED CYCLIC COURSE OF ACUTE OTITIS MEDIA.

BY PROFESSOR O. KOERNER.

Translated from the *Zeitschr. f. Ohrenhkk.*, Vol. XLVI., 1904, German
Edition of these ARCHIVES.

ZAUFAL has stated that the course of an acute otitis media is a typical one and corresponds to the cyclic development of the pathogenic agent. When the parasite has reached the full point of its development—that is, when the medium is exhausted, similarly to pneumonia there is a resolution of the inflammatory process characterized by a sudden critical diminution of temperature. This natural course should not be disturbed by paracentesis. I have never observed in an uncomplicated case of otitis media high temperature lasting several days with subsequent sudden drop as occurs in pneumonia. Heine also reports that he has never observed this cyclic course of a middle-ear suppuration. It therefore seems probable that this pneumonic temperature curve if it occurs in an otitis is not caused by the otitis but by a complication such as a pneumonia focus.

It has long been known, and Preising has recently again drawn attention in his classical paper to the fact, that pneumonia occurs with otitis very frequently in childhood and almost constantly in nurslings. It is very easy to overlook these pneumonias as there is usually only a small area involved, which remains undiscovered from absence of cough, expectoration, pain, and dyspnœa. The examination of the lungs does not reveal this area unless it should be situated near the thorax wall.

While I have never observed a pneumonic temperature curve in uncomplicated otitis, in the few cases of otitis with such a curve which have been under my care I have always discovered a more or less latent pneumonia. We must assume, therefore, that a high fever lasting several days with a sudden critical fall in otitis depends upon a simultaneous pneumonia. Then the theory of the cyclic course of an otitis is robbed of its foundation and the subsequent treatment of Zaufal loses its important theoretic support. The following are three cases of otitis media with a simultaneous pneumonia which at the beginning was latent :

CASE 1.—H. D., seven and a half years old, was taken ill on March 19th, without known cause with pain in the ears and fever. Four days later on admission the drums were injected, lack-lustre, and bulging. T. 39.8° . A paracentesis evacuated a serous fluid. The temperature then fell to 40.5° . As the perforation seemed to be large enough to permit the escape of the serous discharge, another cause for the fever was looked for, and in the lower lobe an area was found as large as a dollar with distinct crepitant râles. There was no coughing. The temperature remained high for two days and then suddenly dropped to normal. On the 30th of March the patient is cured and the ears are normal.

In this case the pneumonia would not have been observed if it had not been carefully examined for; the otitis would have been held responsible for the fever.

CASE 2.—F. S., ten years old, was taken ill on January 18th, with pain in the left ear and fever, and admitted two days later. T. 39.4° ; left drum without lustre, thickened, flattened, and somewhat injected. Paracentesis evacuated no exudate. The lungs were examined and found normal. The pain in the ear was relieved. On the following day, T. 40.4° . On the left side between the scapula and the spinal column bronchial breathing. The temperature remained up for two days and then fell to normal. In the area of the bronchial breathing there were crepitant râles and some coughing. On the tenth day he was allowed to go home with a healed drum.

In this case the pneumonia might easily have been over-

looked. The symptoms and the picture of the drum seemed to be those of a severe otitis, but the paracentesis showed otherwise.

CASE 3.—F. B., seven years of age, suffered from pain in the ear and fever on February 9th. Two days later he was admitted to the ear clinic. T. 40.4° . The left drum is pale, clouded, bulging. No details. Paracentesis evacuated a slight serous discharge. The membrane is very much thickened. That evening the temperature had not dropped. The lungs were examined and bronchial breathing was found to the left of the spinal cord. There is no coughing and no pain in the side. On the fifth day there was a dry cough with superficial breathing. An extension of the pneumonia to the right lower lobe accounted for this aggravation. On the eighth day the temperature fell by crisis from 40.7° to 36.2° and then to normal. Notwithstanding the unusually thickened drum from inflammatory infiltration and the severe pain in the ears and the slight stupor, the otitis proved to be mild on paracentesis and in its subsequent course.

The pneumonia might here also have been overlooked until its extension to the other lobe and the onset of the cough with difficulty in breathing.

EXOSTOSES AND HYPEROSTOSES OF THE EAR CANAL AS A CAUSE FOR SEVERE PURULENT OTITIS.

BY DR. MEYER, HANOVER.

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THE formerly accepted statement that hyperostoses of the canal occur after middle-ear diseases has recently been opposed by Koerner. The opposite condition, namely, that occluding exostoses can produce middle-ear disease, is not mentioned in literature. Mention is occasionally made of a collection of desquamated epithelium occurring in the canal between the exostosis and the drum, which gives troublesome symptoms but does not disturb the hearing. These retention masses may exert so severe a pressure on the drum as to destroy not only the drum but the ossicles and cause them to completely disappear. This, if an infection should supervene, would seriously threaten the life of the patient.

A patient nineteen years of age has suffered for at least eleven years from an occluding exostosis in the right canal. This had produced no symptoms suggestive of severe disease of the middle ear. A short time before admission he complained of deafness and headache. The right canal was completely occluded by a hard subcutaneous tumor arising from the lower and posterior wall of the canal. The tumor extends very much more external than usual. There are no symptoms of inflammation. Hearing for whisper reduced to 20-70cm. At operation unusually extended de-

struction of the middle ear was found. On detaching the auricle directly below the temporal line there was a depression in the bone filled with connective tissue. The tumor could then be palpated. It begins at the level of the porous acousticus externus and springs from the lower and posterior walls of the bony canal. The tumor is easily removed after breaking through its attachments. Behind the tumor the canal is filled with detritus. The drum and the ossicles are absent as well as the outer attic wall. The tympanum contains detritus. The antrum is small and filled with granulations.

In the subsequent course between the third and fourth week symptoms of pyæmia developed which led to another operation, when a small fistula was discovered extending to the sinus. This part of the case will not be described further as it will be subsequently published under another heading. It is remarkable that these severe disturbances of the middle ear and temporal bone caused such slight symptoms. The active infection probably only occurred in the last few days. The indication for operation was the complete closure of the auditory canal and pronounced deafness.

The **second case** was that of a woman thirty-eight years of age who presented large exostoses in both auditory canals. These had existed for at least eight years without causing any symptoms. A short time ago the patient noticed a diminution of her hearing and a slight discharge from her left ear. This led her to consult an aurist who discovered hyperostoses in both canals arising from the posterior and the anterior walls. These tumors met in the lower half of the canal, leaving a small oval opening above. This led to a narrow tract going forward through which nothing of the drum was visible. This passage is filled with moist detritus. The hearing is reduced one half. Examination with the tuning-fork showed a sound-conducting lesion. On irrigating the canal with a tympanic canula the irrigating fluid entered into the nose. As there was no history of any inflammation in the ears, it must be assumed that the accumulations of epidermis behind the hyperostoses had gradually destroyed the drums. The treatment consisted in

daily irrigation, which was followed by the use of alcohol. The condition in the left ear improved. In the right, however, the mucous secretion did not cease and there was tenderness over the mastoid. One year later the simple mastoid operation was performed.

On opening the antrum there was moderate disease. The hyperostosis was not removed. This was followed by healing up. The ear canal is dry and free from detritus, a condition which has persisted until the present time.

HERPES OF THE AURICLE WITH NEURITIS OF THE FACIAL NERVE.

BY DR. T. SARAI, JAPAN.

Translated from *Zeitschr. f. Ohrenhilk.*, German Edition of these ARCHIVES,
Vol. XLVI., 1904.

THE simultaneous appearance of a vascular eruption in the auricle and paralysis of the facial nerve has not been frequently noted. The only otologists who have reported observations of this occurrence are Gruber and Politzer. Their reports have, however, not become well known because in the recent books and in Blau's *Encyclopedia* facial paralysis as a complication of auricular herpes is not mentioned.

The observations of these two authors showed that in these two cases it was not an accidental appearance of a facial neuritis and herpes of the auricle, but the two conditions were associated. This latter supposition is made probable by the following case.

A. C., twenty-four years of age, suddenly was taken with severe pain in and in front of the left ear, on October 1, 1902. On the following day there was a left-sided facial paralysis.

On October 4th the following conditions were noted: paralysis of all branches of the facial nerve; loss of taste in the anterior third of the left half of the tongue; position and motility of the palate normal. In the left conchal cavity there were a number of small vesicles with clear contents on a red and swollen base. There was a painful swelling of a gland in the left retro-maxillary fossa; canal, drum, and hearing normal. The pain is still present. The patient is unable to say exactly when the vesicles appeared, as she has kept her ear wrapped up since the onset of

the pain. At first the temperature was somewhat elevated, but it has since become normal. The vesicles healed in about thirteen days without any new eruptions. The pain ceased on the second day of treatment. The facial paralysis, notwithstanding electric treatment, did not disappear before the fifth month.

Politzer in the third edition of his text-book says, on p. 167: "Occasionally together with eruptions there is a paralysis of the facial nerve on the same side, as I have had opportunity of observing in a number of cases. Remaining neuralgias, as are common after intracostal herpes, have come to my notice in only one case, in which the pain disappeared several weeks after recovery."

Gruber's case is reviewed in Blau's *Year Book*.

An anæmic patient thirty years of age suffered with severe pain in the left half of the forehead three days ago, then in the auricle, which became swollen, and two days later the face became twisted. Examination showed that the anterior surface of the auricle was swollen, red, and hard. In the concha there was a group of small, dark-blue, serous vesicles. Those near the canal contained pus. Its posterior wall and the drum were inflamed; total left-sided facial paralysis. On the following day the pain had disappeared after placing a solution of 5% cocain on the vesicles, but a new eruption had taken place on the antihelix. The aural condition healed in two weeks. The facial paralysis disappeared almost completely in six weeks. To explain these cases we naturally turn to the herpes of the intracostal nerves. This is generally assumed to be a trophic disturbance by neuritis of the diseased nerve or its intravertebral ganglion, but in these cases the vesicles were not situated in the area of the facial nerve but in that of the auriculo-temporal. Presumably this was a primary neuritis of the auriculo-temporal nerve which sometimes is followed by herpes and in other cases communicates by anastomoses with the facial.

After completion of this article, a study of the literature has shown us that some other cases of auricular herpes with facial paralysis have been described. In addition, recently another case has come under our notice in which the herpes was followed by paralysis of the facial and of the auditory nerve as well.

REPORT OF A CASE OF PURULENT MENINGITIS FOLLOWING RADICAL MASTOID OPERA- TION.—RECOVERY AFTER OPERATIVE IN- TERFERENCE.

BY R. JOHNSON HELD, M.D., AND S. J. KOPETZKY, M.D.,
NEW YORK.

R. R., female, aged three years, appeared at the Manhattan Eye, Ear, and Throat Hospital on December 13, 1904. Her family history was negative.

She never had any of the diseases of childhood and always possessed good health until December, 1903, when, following an attack of acute coryza, the right ear began to suppurate. Six months later otorrhœa appeared in the left ear. Since that time until her appearance at the hospital both ears continued to discharge, and because of this, and the foul odor of the discharge, the patient was brought for treatment.

The examination of the right ear evidenced the external auditory canal excoriated, the discharge foul-smelling. When this was cleaned away a thickened, swollen drum came to view, bearing a large perforation in its antero-inferior quadrant. The end of the hammer handle had disappeared through necrosis. Examination of the attic gave evidence of extensive necrosis and the presence of granulation tissue. The right ear, upon examination, was found to be in the same condition as the left, but the involvement was apparently of a lesser degree. A larger perforation was situated in the postero-inferior quadrant, but the ossicles were intact. Necrosis was demonstrable in the attic, and considerable inflammatory granulation tissue was evident.

Bacterially, a smear made from the ear discharge showed a mixed infection, staphylococci and streptococci predominating.

The rhino-pharyngeal space was normal.

The patient was put under the usual rational treatment, and kept under observation. No apparent improvement setting in after four months, operative procedures were instituted. On April 29, 1905, the usual radical mastoid operation was performed upon the right side.

Considerable necrosis of the walls of the aditus and of the tegmen antri, besides the usual amount of cell detritus and granulations, was found. Removing the necrotic tegmen antri, an area of dura, about one centimetre in diameter, was uncovered. The exposed dura showed healthy and was left undisturbed. *No pus was found* between dura and bone.

Because of the exposure of the dura, no flap was made at this time the post-auricular wound, being kept open, was lightly packed and external dressings applied.

Bacterial examination of some of the wound scrapings showed a mixed infection of staphylococci and streptococci.

Excepting a reactionary temperature of $101\frac{1}{2}^{\circ}$ F. immediately after operation, the recovery proceeded without noteworthy incident. May 9th the plastic flap was cut and the wound sutured May 19th witnessed the removal of the bandage, and on May 25th the patient was discharged from the hospital. Nine weeks later the patient's right ear was pronounced cured, dermatization having been completed, and the ear found to be absolutely dry.

Meanwhile, both during the patient's sojourn in the hospital, and during the post-operative period, the left ear had received careful attention, and had seemingly yielded to treatment, so that when the child left for the country only a slight discharge was evident from this ear. Instructions were given to continue treatment for this, until further report.

No chance was afforded to see the child again until four months later, when examination revealed the right ear healed, but the left (which had probably been neglected meanwhile) was suppurating, and evidenced an advance in the amount of necrosis.

Here, too, the radical operation was suggested and agreed upon by the parents of the patient, but unfortunately was necessarily postponed because of an attack of scarlatina to which the child was subjected at this time, and it was not until March 13, 1906, that the radical operation was performed on this side. At this operation the usual findings were made. Antrum and mastoid cells were filled with detritus and granulations, the attic wall was necrotic, and the tegmen over the entire antrum and aditus,

extending to the epitympanic space, was absent, disintegrated by the necrotic process.

The exposed dura, in area $1\frac{1}{2}$ by $\frac{3}{4}$ cm, was covered with small granulations, and looked darker than the normal. *No pus* was found in this region, and nothing indicated interference with the dura.

The post-auricular wound was left open, cleansed, and lightly packed.

Fear being entertained of an atresia of the external auditory canal, it was split, and the edges of the canal-cut tamponed back. Scrapings from the mastoid gave a mixed infection, staphylococci predominating with some streptococci.

For a week following the operation nothing out of the ordinary was noticeable. The first dressing was undertaken on the sixth day; the wound found healthy and clean. At subsequent changes of dressings nothing was noteworthy except that healing granulations appeared rather slow. On April 8th the child was sufficiently improved to leave the hospital, and for two weeks thereafter appeared daily for dressings. Recovery proceeded slowly, but steadily. Occasionally some discharge from the *middle* ear was evident at the change of dressings.

On May 8th, when the child appeared at the clinic, the mother reported a restless night having been passed, and that the child had been unaccountably restless and irritable. The dressing showed nothing unusual in the wound. The following night the child cried considerably and was very restless, and vomited. The mother reported the child as having been feverish. For forty-eight hours longer the child was left in the mother's charge, but the symptoms became more marked, a slight retraction of the head becoming noticeable, and for the better supervision and observation of the case the child was re-admitted to the hospital on May 11, 1906.

Status on Admission: The head was markedly retracted. The pupils were dilated, and the right eye deviated slightly outward. The patient was restless and cried considerably. The temperature was 102.4° F., pulse 144, respiration 75.

Immediately upon admission the dressings were removed and careful local examination instituted. Considerable pus was found in the wound cavity and dressings. The wound itself was covered with fairly healthy granulations. The dura was blanketed with thickly sprouting granulations of a dark color, the

whole bulging into the wound cavity. Pulsations of the dura were absent.

To assist diagnosis, a lumbar puncture was made, the blood examined, and the condition of the eye fundus inquired into.

The examination of the spinal fluid by the hospital pathologist showed it to flow with but slight increase of pressure, and to contain principally pus, and a large quantity of extracellular diplococci which, however, decolorized by Gram's method, although they appeared like pneumococci (Zabriskie).

The blood examination revealed:

Hæmoglobin.....	56 %
Erythrocytes.....	5,693,963
Leucocytes.....	22,648

Differential count:

Large mononuclear lymphocytes.....	4.0 %
Small " "	9.6 %
Polynuclear neutrophiles.....	84.2 %
Mononuclear leucocytes.....	1.8 %
Transitional forms.....	0.4 %

The eye fundus evidenced unmistakably double choked disk, with decided swelling at the margin of the optic papilla.

The results of these examinations, taken in connection with the clinical picture which had meanwhile developed—the head retraction more marked, the divergence of the eyes very evident, the stupor and somnolence, with fever,—made for a diagnosis of purulent otitic meningitis.

During the next twenty-four hours the clinical picture fully developed. The temperature remained high, ranging from 102° to 103° F., and after consultation, a hopeless prognosis having been given, it was decided to make an exploratory operation to drain the interior of the dura, and, if possible, afford an outlet for the accumulating purulent exudate.

On May 12th the patient was operated upon, up to the time of operation having been in a condition of stupor or unconsciousness for twenty-four hours. The old mastoid wound on the left side was first carefully curetted and enlarged, the mastoid cavity cleansed of granulations, and the surface of the darkly discolored and bulging dura cleared of all granulations. This accomplished, the lower portion of the squamosal plate of the temporal bone was removed, making an opening 3 by 3½ cm. Through this opening the dura evidenced dark and congested.

Considerable bulging was evident but no pus was seen between dura and bone.

The dura was then incised by a horizontal incision extending the entire length of its exposure, along the lower and external edge of the bone wound. Immediately upon opening the dura purulent fluid escaped, in amount, estimated, from one to two drams. Unfortunately, because of the suddenness of its appearance, none of this fluid was preserved for subsequent examination. The brain substance immediately protruded in the wound, and was found soft and friable. The wound was then flushed with very hot saline solution, and the brain substance as far as could be reached was carefully wiped, the brain was lifted upward gently, and wiped underneath, and a strip of plain gauze was introduced between the brain-base and the dura, downward toward the interior of the skull. The gauze was kept in one long strip, the end of which protruded and was finally taken up in the outside dressings.

The mastoid cavity was also washed, wiped, and dressed, and the external dressings applied.

The only part of the technique to which we wish to call attention was the frequent flushing of the entire operative field with very hot saline solution, it being our intention to keep the exposed brain tissue continuously hot.

The next morning the temperature rose to 105°, pulse 170, and respiration 80. Restlessness and lack of sleep persisted, necessitating the administration of opiates.

On May 14th the left ventricle was entered by means of a Quincke needle and canula, and about a dram and a half of purulent fluid removed. Lumbar puncture was now undertaken as a therapeutic measure, and about 40cc of a grayish-white, turbid fluid withdrawn. Microscopically this contained, besides numerous red blood cells due to a fault of technique, predominating polymuclear leucocytes, with a few small round cells and an occasional epithelial cell. The cells numbered 410,000 to the cubic centimetre in the following proportions :

Polynuclears.....	91 %
Small mononuclears.....	8 %
Endothelial.....	1 %

Bacterially the fluid contained a few diplococci intracellulars, about three or four in twenty microscopic fields. Cultures, however, gave a mixed infection, the bacteria present being diplococci

and staphylococci, the staphylococci overgrowing the diplococci in the last set of cultures. The first set and the smear gave a Gram negative, intracellular diplococci present in moderate quantity.

Following the lumbar puncture a distinct improvement was noticeable. The respiration fell to 24-30 and the pulse to 120-140, and the temperature curve from 101.6°-103.2° F. Sleep was quieter, but restlessness was still marked.

On May 16th another lumbar puncture was made and 30cc of grayish fluid withdrawn. Its examination evidenced polynuclear leucocytes predominating, and some endothelial cells present.

The formed elements numbered 330,000 to the cubic millimetre.

Polynuclear leucocytes.....	73 %
Mononuclear leucocytes and lymphocytes.....	25.5 %
Endothelial cells.....	1.5 %

Bacterially there were mostly staphylococci, but some diplococci which were *not intracellular*. The culture from this fluid gave a pure culture of staphylococci.

The patient's condition improved during the next two days, the temperature dropping to between 99.6° and 101.8°, the pulse ranging from 100 to 140, and the respirations from 26 to 30. Restlessness became less marked and sleep more natural. Additional nourishment was now given and retained.

Lumbar puncture was again performed on May 18th and this time 35cc of a clear, limpid fluid was withdrawn containing a very small amount of white sediment, some blood, but no coagula.

Now lymphocytes predominated in the cellular content, many polynuclear leucocytes were present, and a few endothelial cells. In number the formed elements were 295,000 to the cubic centimetre, as follows :

Polynuclear leucocytes.....	45 %
Polynuclear lymphocytes.....	52 %
Endothelial cells.....	3 %

A good many amylaceous bodies were found in the fluid and a moderate number of red cells.

Bacterially, a smear made from the sediment showed a very few small cocci, some single and some arranged in pairs, *none intracellular*. Cultures made in different media gave pure growth of staphylococci.

The eye fundus still evidenced choked disk, but the swelling of the margin of the optic papilla was less marked.

Decided improvement of the retraction of the head became evident, restlessness was still present but less marked, and, generally speaking, improvement continued.

The first dressing was undertaken on May 23d, nine days after operation. The gauze drain was removed from the cranial cavity. The wound looked healthy and was covered with clear, clean, healthy granulations. The dura, while thickened, was taking upon itself a lighter color and appeared only slightly congested. At this period the temperature ranged near the hundred mark, the pulse varied from 106 to 130, and the respiration between 24 and 30.

From this time on improvement progressed slowly and gradually. The intelligence cleared, the temperature gradually came to the normal, nourishment was increased in amount and retained; the rigidity of the spine and the retraction of the head disappeared, the eye fundus cleared—in full, the case became entirely well so far as the meningeal symptoms were concerned.

Locally some trouble was experienced in the wound because of a protrusion of brain substance through the dura. This was carefully pushed back by gradually increasing pressure exerted by the external dressing and packing until finally the protruded brain substance was pushed back into the cranial cavity. The mastoid wound meanwhile healed, until to-day it is dry, presenting only a very small post-auricular opening which at any future time can be closed by proper plastic procedure.

The child was discharged from the hospital on July 8, 1906, because of phlyctenular keratitis due to hospital confinement, and is still reporting at the clinic for observation once weekly.

Aside from the results obtained by the radical measures instituted, this case presents three interesting factors:

- (1) The question of diagnosis.
- (2) The results obtained from lumbar puncture influencing the prognosis.
- (3) The surgical measures to combat the accumulation of purulent exudate in the arachnoidal spaces, together with employment of lumbar puncture as a therapeutic agent.

Many clinicians never differentiate between a purulent meningitis and the epidemic form of cerebro-spinal meningitis, the clinical picture being about the same in both forms. In fact Councilman (*Four. A. M. A.*, April 1, 1905) holds that

the acute type of meningitis, wherever primary, is more generally due to the intracellular diplococcus than is supposed. Purulent otitic meningitis, a distinct type of purulent meningitis, is that intracranial complication of either acute or purulent mastoiditis which we, as otologists, most frequently meet.

A glance at the clinical picture evidenced by the above history left very little doubt in the minds of those who saw this child at the time of her illness as to the diagnosis; and the examination of blood evidencing a pathological polynuclear leucocytosis, the early presence of choked disk, the bacterial findings in the first lumbar puncture undertaken, and the examination made by the pathologist of the hospital—showing extracellular diplococci appearing like pneumococci—would ordinarily be evidence enough upon which to base the diagnosis. Körner, Macewen, and many other clinicians base the opinion as to the type of meningitis present in a given case upon the origin of the infection.

The story of the findings at the operation on the mastoid of the left side evidencing extensive necrosis, with tegmen destroyed, and the dura exposed and discolored, would account for the origin of the invasion in this case; nor can the period of quiescence intervening between the time of mastoid evisceration and the development of the meningeal symptoms rule out this source of infection, notwithstanding that this period was sufficiently long to permit the child to become apparently well enough to be discharged and sent home, for, as Körner, Brieger, Cohn, and others have pointed out, there are types of otitic purulent meningitis wherein the period of quiescence may be extended for some time. This case evidently would classify with this type of meningitis.

Bacterial examination from the mastoid evidenced a mixed infection, staphylococci predominating; the first examination of the spinal fluid evidenced similar findings, and this alone, in our opinion, is proof sufficient of the extension of the bacterial invasion by contiguity. True, the examination of the spinal fluid on May 14, 1906, gave

evidence of a few diplococci intracellulares, about three or four in twenty fields, but cultures made from this specimen gave mixed infection. Smears made from the cultures gave a Gram negative, and some diplococci intracellulares, but the predominating culture growth was staphylococci. This was the only specimen of spinal fluid which gave the intracellularis. The fluid withdrawn three days prior, and the fluid obtained two days later, showed no diplococci intracellulares present. Both these gave the extracellular diplococcus combined in a mixed infection with staphylococci. Besides, we have seen the adventitious presence of diplococci intracellulares in ear discharge, and in the scrapings from mastoid wounds (Dr. Brooks, pathologist of the New York Post-Graduate Medical School and Hospital, reporting the findings in three of our cases—one from mastoid wound scrapings and two from cases of acute otitis media; and Dr. Zabriskie, pathologist of the Manhattan Eye, Ear, and Throat Hospital, finding these organisms in scrapings from the mastoid wound in one case of ours operated upon for acute mastoiditis). Furthermore, when we remember the harmless presence of this organism in the many observations made on nasal secretions, and its presence in the cases cited above, we can but feel that its presence in this one specimen of spinal fluid was adventitious, and not the evidence of meningeal infection by Weichselbaum's diplococcus. Its absence at subsequent examinations, its absence in the mastoid scrapings, and its overgrowth in culture by the predominating organisms, the staphylococci, strengthen our belief in this opinion.

In this case the lumbar puncture, originally made to assist diagnosis, gave evidence of the nature and progress of the pathological lesion. The amount of pressure was slightly higher than normal at the first puncture made. The bacterial examination revealed the same organism as found in the mastoid scrapings. No cyto-diagnosis was made at this examination.

Hereinafter we have tabulated the results of lumbar puncture.

TABLE.

Date.	Amount.	Color.	Cells to c. c.	Poly. Leucoc.	Small Mono.	Lymph.	Endoth. cells.	Pressure.	Bacteria.	Culture.	Miscellaneous.
May 11.	About 20 c. c.	—	—	—	—	—	—	Not much.	Extracellular Diplococci Pneumococci.		
May 14.	40 c. c.	Grayish white, turbid.	410,000	91 %	8 %	—	1 %	Some pressure.	Few Diplococci intracellular.	Mixed inf. Dipl. and Strept. Staph. pred.	Blood cells due to faulty technique.
May 16.	30 c. c.	Grayish fluid.	330,000	73 %	11 %	14.5 %	1.5 %	Not much.	Mostly staph. Very few Dipl. extra-cellular.	Staph. pure.	
May 18.	35 c. c.	Clear limpid white sediment.	295,000	45 %	—	52 %	3 %	Not much.	Cocci small, some in pairs, some in single, none intracel.	Pure Staph.	Many amylaceous bodies present.

We note the condition of hyper-polynucleosis in the beginning stages of the intracranial infection. We note the decrease in the number of formed elements to the cubic centimetre as the meningeal condition improved. Within four days three successive punctures gave evidence of the falling off in the total number of cellular elements present (from 410,000 to 295,000 cells to the cubic centimetre). The marked hyper-polynucleosis present in the first fluid subjected to cyto-diagnosis would, in itself, according to the opinion of many authorities (see "Lumbar Puncture," Kopetzky, *American Journal of Med. Sciences*, April, 1906), suggest the nature of the meningeal infection.

We note further the gradual increase in percentage in the small mononuclear leucocytes and lymphocytes, from 8% in the first examination to 52% in the last examination, and we draw the conclusion that when at subsequent punctures the fluid shows a lowering in the total number of cells present to the cubic centimetre, the percentage of polynuclear leucocytes falling at the same time, and an increase in the percentage of the small mononuclear leucocytes and lymphocytes, then a favorable outcome of the disease is to be expected.

We base this conclusion on the consensus of opinion expressed by many authorities of the significance of the findings in spinal fluid, polynucleosis being considered a sign of an acute and violent meningeal irritation, and the abatement of the polynucleosis indicating the lessening of the meningeal irritation, the lymphocytosis increasing as recovery progresses. Further observations along this line may establish the correctness of this sign as of prognostic value.

One other finding in the spinal fluid is noteworthy. In the last fluid taken, when the case had just passed through its crucial period, and when hopes were entertained for its ultimate recovery because of the clearing in the clinical picture, many amylaceous bodies were noted in the fluid. We know of no observation extant as to these bodies in spinal fluid, nor do we know how to account for them.

Before lumbar puncture became an aid to diagnosis and

therapeutics the advent of purulent meningitis was generally regarded as leading to an unfavorable outcome. In cases which recovered there always existed the suspicion as to the correctness of the diagnosis. But when the purulency of the meningeal invasion is demonstrable, and results of operative interference prove successful, no doubt can exist as to the value of the operative measure instituted. Macewen's classic case, wherein he healed, through the removal of the infected foci, a case of sero-purulent arachnoiditis, gives the basis for the idea that purulent invasion of the meninges is curable by surgical measures (Macewen, German edition, p. 336).

Gradenigo (*Arch. f. Ohrenheilkunde*, No. 47, Cases 3 and 4) reports two cases cured, and Bertelsmann (*Deutsche med. Woch.*, 1901, p. 277) reports one case cured, in which they repeated the surgical procedure as performed by Macewen, but enhanced the results obtained from the surgical removal of the primary foci by the employment of lumbar puncture. Since then others have repeated the procedure with varying success. Körner (*Otitische Erkrankungen des Hirns, der Hirnhäute und der Blutleiter*, Wiesbaden 1902, p. 56) states that in all previous cases of cured purulent arachnoiditis, the cases consisted of those in which the infection of the meninges had not progressed far. He further states that in no case whose report was available to him has he found that the spinal fluid was distinctly purulent.

In our case there was distinct purulency. Following the incision into the dura a dram and a half of pus came away, and while this in itself might mean only an intradural abscess, the extent of the purulent invasion,⁶ the general involvement of all the meninges by the purulent exudate, was demonstrated by the results of the ventricular puncture which delivered about a dram of purulent fluid, to say nothing of the recognized organisms found in the spinal fluid as late as six days after the operation.

While it is not our intention to draw conclusions from this one case, we cannot but feel that certain facts were demonstrated by it. Jansen's warning, that it is a mistake, in

beginning meningeal infection, to wait, even where diagnosis is doubtful, until the meninges are overwhelmed, has proven in this case a true sign. We hold that our results are ascribable to the prompt surgical interference, the removal of the primary accumulations of purulent exudate, both intradural and intraventricular. The subsequent recovery of our case was aided by keeping the intracranial pressure as nearly normal as possible through repeated lumbar puncture, in connection with which we must not lose sight of the fact that we increase the bactericidal properties inherent in the fluids, by removing it with its contained organisms, thus causing its reproduction, with heightened antibacterial qualities.

Regarding technique, when indications are such that the dura must be opened, we hold with Körner that the dura should be wide opened. The dangers of brain hernias is of secondary importance to that of a direct inspection of the brain surface to determine its condition.

In conclusion, we present this case as one of purulent meningitis, the route travelled by the invading organism, evident at the operation on the mastoid; the diagnosis substantiated by the findings in the spinal fluid, and the development of the clinical picture. The case was cured by freely opening the dura, removing purulent exudate from within it, together with the removal of purulent fluid from the ventricles, and the judicious employment of lumbar puncture, to keep the intracranial pressure down, and to give evidence not only of the progress of the pathological infection, but by the removal of bacterially contaminated cerebro-spinal fluid, causing its replacement by new fluid with heightened bactericidal properties.

We wish to express our thanks to Dr. Higgins for valuable aid and painstaking care in carrying out the details of the cyto-diagnosis of the spinal fluid, and in making the culture experiments.

A CASE OF ACUTE SEPSIS BEGINNING ON
THE THIRD DAY OF AN ATTACK OF ACUTE
MIDDLE-EAR INFLAMMATION; EXAMINA-
TION OF THE SIGMOID SINUS; RECOVERY.

By JOHN DUNN, M.D., RICHMOND.

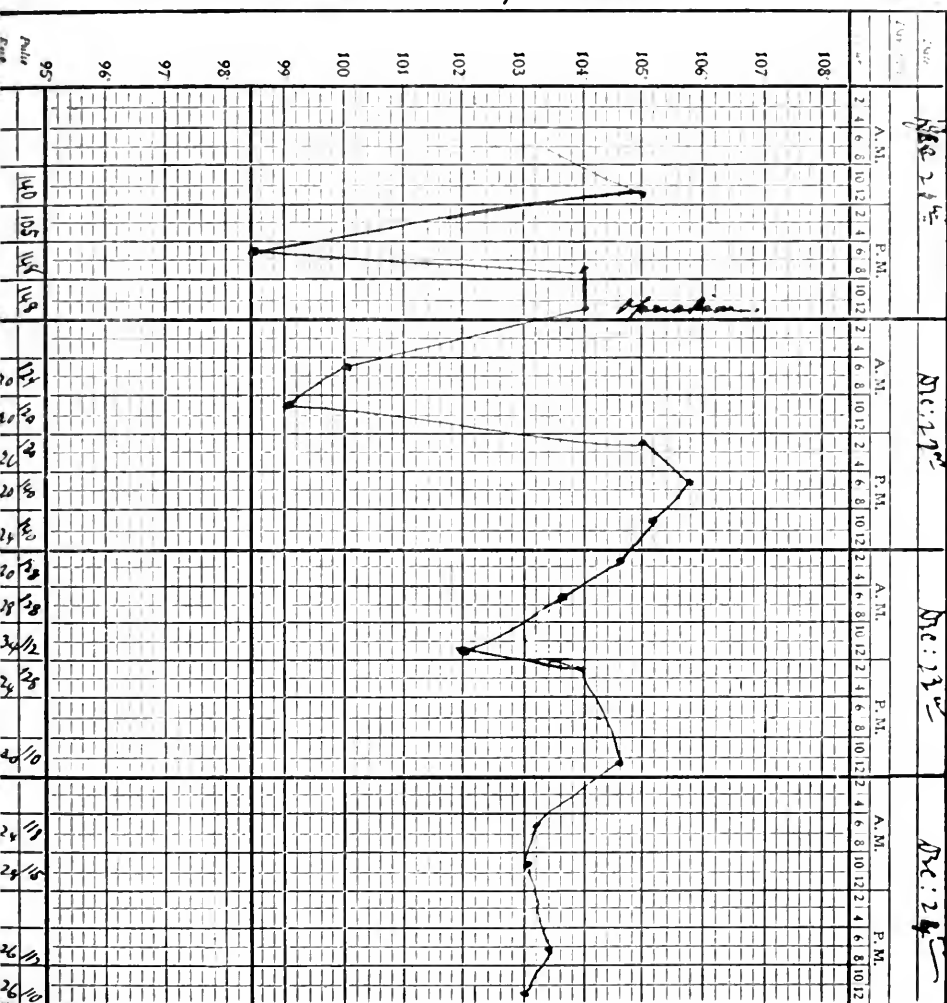
(With a Temperature Chart.)

Mr. B. W., aged sixteen, was taken, on the evening of December 15, 1905, with a left-sided earache. The pain was severe and he applied to a medical student boarding in the house with him for treatment. Some simple remedies were given. On the morning of December 18th, the patient had a severe chill, with high temperature. During the afternoon the temperature fell to nearly normal, but only to rise again that evening. On the morning of December 19th the temperature was again low. The boy, however, was suffering so much that during the afternoon, the temperature having risen again very high, Dr. M. E. Nuckols was called in. The morning of December 20th the temperature rose to 104° ; there was some little remission in the afternoon. Next day at 12 o'clock the temperature was 105° , pulse 140, respiration rapid. It was at this point that I saw the patient. I found him in a semi-stupid condition. He could be aroused and would answer questions intelligently, but if left alone he would immediately relapse into his former condition. He was sweating profusely, his night-shirt and the bedclothes being soaking wet. Dr. Nuckols informed me that he had several times carefully examined the chest and abdominal cavities and could find no cause for the patient's condition, that the patient had complained much of pain in his left ear, and that he feared, so severe were the symptoms, that meningitis might be accompanying the ear trouble

VIRGINIA HOSPITAL.

NAME AND AGE E.B. 16 years

ADMITTED December 15, 1905. WARD _____



as Koenig's sign seemed to be pretty well marked. He added that the profuse sweating had been present for more than twenty-four hours.

There were no external evidences of mastoid inflammation ; no pain on pressure. The boy, however, had complained of much pain in the region of the left ear. There was no discharge from the ear ; nor could any history be obtained that there had ever been. There was no pain over the jugulars. The fundi were normal. I opened the drum but obtained only serum and blood. At six o'clock that afternoon the temperature was normal ; pulse 105. At eight o'clock the temperature was 104 ; pulse 104. The patient was taken to the Virginia Hospital where at 12 o'clock he was operated upon. All during the anæsthesia the profuse sweating continued, the pulse remaining weak and rapid. The mastoid was found to be normal until a cell opening into the antrum was reached when pus was found. The antrum also contained a foul-smelling pus. The bony walls of the antrum appeared to be healthy. The sigmoid sinus was exposed. The mastoid emissary vein was cut through and bled freely. The sinus, although its wall appeared to be normal, was opened. No evidence of disease could be found. The usual dressings were applied. At 10 o'clock next morning, Dec. 22d, the temperature (rectal) was $99\frac{1}{2}^{\circ}$, pulse 120, respiration 20. At 6 o'clock P. M., the temperature was $105\frac{3}{8}^{\circ}$, pulse 140, respiration 24. At 12 o'clock Dec. 23d, the temperature was 102° , pulse 112, respiration 34. It was noticed from now on that the sweating greatly diminished and that although the temperature remained high and the respiration varied from 24 to 34 the pulse grew slower. On the afternoon of Dec. 23d, the patient complained of pain in his right side. Examination revealed no trouble save some bronchial râles. Evening temperature Dec. 23d, $104\frac{3}{8}^{\circ}$. On the morning of Dec. 24th, some pneumonic consolidation was demonstrable in the lower right lobe. From now on the symptoms were those of pneumonia and not of sepsis, and the patient rapidly recovered.

The above case is an instructive one. The history is one of acute sepsis. The steep temperature curve, the pulse, the profuse almost continuous sweatings, the rapid exhaustion of the patient, his mental condition, taken all together, show this beyond question. Never in the recollection of the patient had there been a discharge from the left ear,

whose drum at the time I perforated it was intact. He had, however, had in this ear for some years past about one attack of earache during the winter. His hearing on this side, as a result, had become slightly impaired. On Friday evening he was taken, while with a cold, with left-sided earache. On the following Monday morning he had a severe chill, and from then on his condition was septic. Undoubtedly the repeated attacks of earache were the result of inflammatory processes which had resulted in lessening the vitality of the middle-ear membranes, including the antrum. It is interesting to note that no pus was discovered in the discharges through the incision in the drum, which healed promptly. Pus was found in the antrum and in a long cell leading to it, but nowhere else in the mastoid process. No evidence could be found of bone disease in the antral walls. It is of further interest to note that the pus formation ceased with the operation and that the extensive postaural wound healed normally and rapidly. There were no visible evidences of disease of the sinus walls, and, save that the venous blood appeared abnormally black-blue, nothing else was to be noticed. That the septic symptoms continued two days after the removal of the pus-focus in the mastoid is probably due to the presence of the already diffused septic material in the blood. It is also interesting to note the relation of pulse, temperature, respiration, and sweating during the period of the sepsis and after its beginning subsidence and the appearance of the pneumonic process. The lessening of the profuse sweating was the first hopeful symptom, the next was the lessening of the pulse-rate, and this even though the temperature and respiration kept high. The patient continued partly delirious the greater part of the time from the 20th to the 23d inclusive.

Treatment: After the operation, for the first three days, every two hours he was given an ounce of whiskey and three drops of spirits of turpentine. Occasionally he refused to take it. After the 23d, the intervals were lengthened. Three times a day his side and abdomen were rubbed with Credé's ointment. To the whiskey and turpentine, peptonized or pre-digested beef was added at intervals. How far the

treatment aided in overcoming the septic poison, I can not say. It is mentioned as part of the history of the case.

Cases of sepsis due to thrombosis of the lateral sinus are common. In these cases, as a rule, ear disease is of long standing and the operator is able to find the bone diseased to the sinus wall or a diseased sinus, or both. In the above case there was no demonstrable diseased bone next the sinus, nor disease of the sinus.

In the ARCHIVES OF OTOTOLOGY, vol. xxxi., No. 2, in an article on "Toxæmia from Suppuration of the Temporal Bone," Eulenstein says, "Acute toxæmia following suppurative processes in the temporal bone is not common, . . . if we exclude those cases in which there is first a thrombus formation in the sinus or the jugular vein, with a subsequent breaking down of this, and thus systemic infection." He had collected, including the case he then reported, in all eight cases. All eight died. "In two of the cases there were some evidences of thrombo-phlebitis." In the other six there was none. "In the few cases in which the jugular vein was examined in its entirety there were no gross signs of disease." In my case no bacteriological examination was made. It is not to be supposed, however, that we had to deal with an unusual micro-organism, but with some condition of the system which made possible the rapid entrance into the circulation and multiplication of the bacteria or their toxins.

The case reported gives nothing new in regard to the channels by which the poisons gained the general circulation, but from the facts that the accumulated pus was limited to the antrum and one of its adjacent mastoid cells, that there were no demonstrable granulations in the antrum, no demonstrable disease of the wall adjacent, we have a right to infer that the absorption took place through the small vessels leading from the purulent area. As there were no external evidences of redness or swelling of the tissues over the mastoid, no pain on pressure, we can again infer that the absorption took place through the small vessels passing inward from the antrum, *i. e.*, into the intracranial sinuses, the sigmoid and its tributaries. The wonder has always been to me that

descriptions of cases like the one above reported are so rarely met with in otological literature, and yet I have never seen in my practice an exactly similar case. The nearest approach was in the case of a school-girl, in whom, on the third day after a radical operation done for chronic incurable otorrhœa, acute toxæmia developed. She lived only two or three days. I intended at the time to report the case, but misplaced my notes. In this case, also, there were no external signs of mastoid inflammation. Deep subjective pain in the mastoid, occurring in the course of acute otitis media, caused me to open the mastoid, and as I had been waiting only for the school session to be over to operate on the ear for the chronic otorrhœa, a radical operation was done. In the mastoid, pus was found only in the cells immediately adjacent to the antrum, and in the antrum. There was no softening of the walls of the antrum or attic. The mucous membrane of both spaces was much diseased and was, so far as I could judge, entirely removed together with the remains of the diseased ossicles and diseased *M. M.* of the middle ear, whose walls I curetted as thoroughly as seemed necessary. In the second or third day after this operation, the patient began to be nauseated, to complain of sore throat, of severe pain in the region of the liver, and to grow jaundiced. Examination of the mastoid wound revealed in the bottom of the external auditory canal a drop or two of sweetish pus. After twenty-four hours the sinus was exposed and opened. It was found to be, as far as the eye could judge, normal both as to its outward walls and its contents. The patient grew rapidly worse, suppression of urine set in, and death took place within a few hours. *In this case, prior to the operation there were present no symptoms of toxæmia, nor any symptoms pointing to involvement of any of the intracranial structures, nor did any symptoms pointing to their involvement appear during the course of the short illness.* When I exposed and opened the sinus I did not expect to find visible evidence of disease. I operated hoping, but not expecting, to find some focus of absorption other than the opened antrum. The probable explanation of the case is that absorption of the septic material took place

through the opened veins in the walls of the middle ear and antrum, whether through the floor of the middle ear into the jugular bulb or through the antral walls into the intracranial sinuses I can not say. There were no evidences of jugular thrombosis. The operation had been imperfect in one of two ways: I had either failed to remove all of the diseased mucous membrane in the middle-ear space, or I had, in flushing the newly made cavity, been unable to wash away all of the pathogenic organisms there present before the operation was undertaken. Owing to some unappreciated condition of the general system, the bacteria left behind had multiplied in the blood filling the bared cavity, and through the veins leading from this raw surface had found their way into the general circulation. It is to be noted that the absorption did not take place "under pressure" but from a raw surface in the absence of any pressure whatever. There are cases of acute general septic infection secondary to purulent middle-ear or mastoid inflammation where neither inflammation of the walls of, nor thrombosis of, the sinus or bulb can be detected by the naked eye at the time of the operation—and it seems that there are cases where the microscope would reveal no sign of inflammation of the sinus walls. Surely in the second case above mentioned we should not expect to find a continuous phlebitis extending from the lateral sinus to the hepatic veins. There are blood conditions, and the present investigations into the nature of opsonins will sooner or later tell us more accurately what they are, where micro-organisms do pass directly into the circulation and multiply therein without the necessity for phlebitic or thrombotic processes about the focus of infection.

The severe pain in the region of the liver probably places the last case in the class mentioned by S. Maccuen Smith in his article, "Middle-Ear Disease in its Relation to Metastatic Abscess of the Liver and Other Viscera," *ARCHIVES OF OTOTOLOGY*, vol. xxxiii., No. 2.

THE DIFFERENTIAL DIAGNOSIS IN OTITIC SINUS THROMBOSIS.

BY DR. F. VOSS, RIGA.

Translated from *Zeitschr. f. Ohrenhkl.*, Vol. L., 1905, German Edition of these ARCHIVES.

SINCE operations on otitic intracranial complications have proved to be life-saving, the interest of the general practitioner has become more active in these patients. We are, therefore, more frequently, and also at an earlier stage, called in to cases where a complication of an otitis media exists and where severe symptoms have set in. We first must decide whether the severe symptoms are the result of the ear disease or the expression of a severe general malady. We are sometimes also asked to determine whether the severity of the disease can be explained by a latent ear-trouble. Our responsibility is especially heavy in those cases, as, for instance, sinus thrombosis, where it must be decided whether so serious an operation should be undertaken in the case of a very severely ill patient. The following remarks show the kind of cases which have proved difficult to me.

High temperatures and rigors are usually the cause for anxiety on the part of the attending physician. In many cases there was also an enlargement of the spleen. This condition can be present in both forms of sinus thrombosis, the pyæmic as well as the septicæmic. In one of the cases which was operated upon by me the spleen protruded beyond the free margin of the ribs, and was palpable as a soft organ. The splenic tumor may, however, be absent, or show so little increase on percussion that its enlargement

may be doubted. In the pronounced pyæmic form of sinus thrombosis with enlargement of the spleen, malaria must be considered from the point of differential diagnosis. This applies especially in those cases observed in malarial regions. I have several times been in the position of diagnosing malaria and not sinus thrombosis in acute chronic otitis. If malarial attacks have previously been present, a careful examination will instruct us on this point, and even on the first examination the spleen will be found decidedly enlarged. As opposed to pyæmia, it will be found hard. The dulness will be marked. This picture was presented by the first one of these patients, whom I observed several years ago. It was a boy with chronic purulent otitis, occasional headache, chills, fever, with fall of temperature, marked perspiration, and a hard, palpable spleen. The history gave two previous attacks of this character in the preceding year. The attack was cut short by quinine, and the splenic tumor disappeared. In another case of chronic otitis media the conditions were not so favorable, as it was the first attack of malaria, when, as is well known, the malaria frequently does not show its typical uniform course, and this is only gradually developed.

B. H., twelve years of age, suffered from left otorrhœa after diphtheria, which has continued to the present day. The suppuration is moderate, somewhat fetid, no pain. On April 2, 1902, the little girl had to leave school on account of illness, and was very restless on that night. On the next day the condition was much better. On April 4th, however, in the middle of the day there was severe headache, vomiting, great fear, and a sense of oppression. Temperature at 2 P.M., 40.5° . When I saw the child in the evening for the first time the temperature had fallen to 36.8° , the condition had improved, headache had disappeared, though there was some pain in the back of the neck. A granulation masked the appearance of the drum. The mastoid process is not swollen nor tender, though there is one area of tenderness $1\frac{1}{2}$ inches beyond the mastoid process. Lungs and heart normal. Splenetic enlargement. The spleen is not palpable. The mother informed me that two other children had suffered from malaria in the preceding year. After a day of good health a similar

attack occurred on the 6th of April, with the same symptoms as two days previously. The headache was especially severe, with vomiting. The splenic dulness was larger. On that evening quinine was administered, and on the 8th of April a similar severe attack took place. On the 9th the patient was quite well. During that night there was an attack of headache and restlessness, but the temperature was normal. The spleen was hard and palpable. There were no further attacks.

These attacks ran the typical course at intervals of forty-eight hours, and the spleen finally could be palpated as a hard mass.

In a third case, where the temperature chart unfortunately has been lost, a young boy with acute perforative otitis media suffered from chills, which, however, did not at first appear regularly. The spleen in this case also was enlarged and palpated as a hard mass. The malaria was cured with quinine, and the otitis media healed rapidly.

The following case of acute otitis media and malaria ran a somewhat irregular course.

E. R., twenty-three years of age, has been practically deaf since July 4, 1901, with headache, fever, pain in the chest, cough, diarrhoea. On admission to the hospital on July 11th, the pain was located in the throat, ear, and chest. There was no discharge, no jaundice, no oedema, no glandular swellings, and no sputum. Temperature, 37.8° – 38.4° . Pulse regular and uniform. Hearing very much reduced. Mastoid processes tender, especially the left. The diagnosis of influenza made and salicyl given, a compress being applied to both ears. There was no splenic dulness. Temperature remained at 38° . When I was asked to see the ears on July 14th, I found cerumen, which on removal permitted an aspect of a somewhat reddened drum. Mastoid processes somewhat tender, the left more than the right. Carbolic acid-glycerin drops were ordered, and hot compresses. The symptoms on the part of the ear gradually diminished, while the temperature ran the following remarkable course. It remained at about 38° until July 16th, when it rose to 40° , without chills. It then fell and remained at 38° until the 21st, when it rose to 39.6° , without chills. After falling again it rose, July 24th, to 40.4° , and gradually diminished, day by day, to 39° , 38° , 37° , until, on August 31st, it became normal.

The rise of temperature took place every time without a chill. The fall was occasionally associated with perspiration. The spleen is not palpable, dulness uncertain, eye-grounds normal. Malarial plasmodia could not be found. There was some headache.

Up to July 31st the patient had taken three times a day salicylate of soda without any effect on the temperature. Then quinine, five grains three times a day, was administered. On the following day the temperature rose to 39.3° ; after that it remained normal, the otitis healed, and the hearing returned to normal.

I am inclined to regard this case as one of an irregular first attack of malaria on account of the striking effect of the quinine, though a splenic enlargement was not determined and the malarial organism was not found in the blood.

With this exception, in all the cases of malaria with otitis a smooth, hard spleen could be palpated, so that I am inclined to believe that a hard spleen is more characteristic for malaria than for sinus thrombosis.

The following case, however, shows that exceptionally a hard, palpable spleen may be one of the symptoms of sinus thrombosis without malaria.

C. H., twenty-five years of age, has had a discharge from the right ear for three weeks. Later she acknowledged that the ear had been running from time to time for years. There was headache for one week, which was more pronounced on the right than on the left side. There was a daily chill during the last four days. On admission the patient appears to be very ill. There is some discharge from the right ear. There is no mastoid swelling or tenderness. Eye-grounds normal. No other symptoms. The spleen is large and hard and protrudes beyond the free margin of the ribs. She is in the fourth month of pregnancy. Notwithstanding quinine, there are one or two rigors a day with a rise of temperature to 39.7° and a fall to 35.4° which produces sweating. The sensorium is free. There are no malarial organisms to be found.

An operation was undertaken on September 24, 1903. A small cholesteatoma was found and the bone overlying the sinus was found diseased. There was a small perisinuous abscess with a necrotic sinus wall. The sinus was thrombosed. It was

exposed for a distance of 6cm and incised. The healthy jugular vein was ligated. The operation was finished at 11 o'clock, and at 1 o'clock labor pains began. On the following day a dead foetus was born.

On September 26th the temperature was normal. There was no pain. On the following day it rose to 39.1° , but without a chill.

On September 29th the temperature rose to 39.4° . The wound is infected and covered with discolored exudate. On two later occasions, the temperature rose to 39.1° and to 38.1° , then the general condition improved. The appearance of the wound was much better. This was followed by rapid recovery and the patient was allowed to go home on October 17th. The wound in the neck was healed. On her discharge the spleen was still large and hard. In the course of the next month it gradually returned to the normal.

Remarks.—The hard, palpable splenic tumor which was absolutely without pain, in conjunction with the typical picture of the attacks, rigors, fall of temperature with profuse sweats, was suspicious of malaria. The absence of the malarial organisms and the negative result of the quinine treatment and the frequent attacks made the correct diagnosis probable and the patient was immediately operated upon.

A spleen of so hard a consistency as in this case and still not tender has only occurred in my experience in malaria. I assumed, therefore, that the patient had previously suffered from malaria. This, however, proved to be erroneous, as the spleen without any other treatment returned to the normal. This case, therefore, shows that a hard, palpable spleen may exceptionally be a symptom of sinus thrombosis. The question, What condition was this? may be answered. It was most probably a splenic infarct, though this would be remarkable on account of the absolute painlessness. A splenic tumor as a symptom of pregnancy is unknown to me.

Among other diseases which might be mistaken for sinus thrombosis when complicated with otitis media on account of their temperature curves, tuberculosis must be mentioned. The following is an example.

H. M., seventeen years of age, was taken ill with measles on February 27, 1902. She entered the hospital on March 4th, with a temperature of 40.1° , which dropped to 37.5° on the following day. There was considerable catarrh of the lungs, which gradually diminished on the following days. Then marked variations of temperature occurred. The exanthem had disappeared on March 9th with slight cough. There was pain in the right ear. On March 11th the patient suffered from a severe chill, lasting half an hour, and the temperature then fell from 40.3° to 35° . I examined the ears on March 12th, and found the otitis media diminishing, the mastoid processes tender, sensorium free, no venous bruit, still some pulmonary catarrh. Paracentesis evacuated no exudate. A few tubercle bacilli were found in the sputum, and on March 15th there were distinct signs of an infiltration of the right apex. The otitis rapidly got well. The previous history stated that the patient had herself always been well, but she gave a distinct tuberculous history. Death after about a year.

Another temperature curve of interest was that of a child three and a half years of age, who in the first week of scarlet fever acquired a bilateral otitis media with total loss of both drums. Without particular glandular swellings, no nephritis, and no affection of the lungs, on the twenty-fifth day sudden remitting temperature set in without rigors. I had occasion frequently to examine the little patient up to the time of her death three months later, and found moderate mucous discharge in the ears, but no tenderness, no eye signs, and the sensorium perfectly clear. As there was no indication, I could not see the necessity of an operation. The child became greatly emaciated, and the autopsy revealed a disseminated tuberculosis. Meninges and sinus completely free.

Forselles regards the differential diagnosis between sinus thrombosis and septic endocarditis as very difficult, as in the latter condition the same symptom-complex is present as in sinus thrombosis. Most important is the examination of the eyes, where hemorrhages are met with in the rectum and conjunctiva. In this case the examination of the blood does not help us, inasmuch as both diseases may be caused by the same organisms. I have had no experience with this

association of endocarditis with otitis media, nor, so far as I recollect, have I seen a similar case reported in literature.

Curiously as it may seem, hysteria must be mentioned from a differential diagnostic point of view, not purely from a theoretical aspect, but because I have seen this mistake made.

A young woman, nineteen years of age, claimed to suffer from severe pain and hyperæsthesia about the ear, especially over the mastoid process, with a daily chill; though the drum was intact, the hearing was normal, and no discharge had occurred. I observed this same patient seven months later. She had then been operated upon and had lost the drum and her hearing, and was desirous of further operation. She still claimed to have rigors, though her temperature remained normal and though her general condition in this long period had not suffered in the least.

Puerperal processes and even pregnancy may cause difficulties in diagnosis and lead to errors.

A healthy young woman at the end of her pregnancy suffered from an acute purulent otitis media, which was accompanied by very severe headache, rigors, with pyæmic temperature. The induction of premature labor was frequently discussed, though there were no abdominal symptoms. The labor occurred normally, though the general condition had not improved. Then, after numerous consultations, the mastoid operation was performed, but the patient died.

Though this was very likely a grave ignorance on the part of the aurist, who apparently had no idea of the possibility of a sinus thrombosis, similar cases of chronic otitis in puerperal fever, with headache and slightly disturbed sensorium, may cause the greatest difficulty in diagnosis.

A woman in the end of the thirties in her first labor suffered from high temperature without rigors and left-sided headache. She had had a purulent otitis on both sides since childhood. The sensorium was free, though she became gradually somnolent. Pulse 100. There were no changes in the ears. The abdomen was soft without pain. There was no thrombosis of the lower extremities. I consulted with the attending gynecologist for one

week, and, although each one of us declared that his branch was not responsible for the fever, we could not say that it was absolutely improbable. Ten days later a tablespoonful of pus was discharged per rectum and the situation was cleared.

If, instead of the pyæmic fever with rigors, the temperature is of the high and continuous type, the diagnosis is then more difficult, and errors, especially with typhoid fever, are frequently possible, as the general impression which these patients give is that of a severe typhoid case. Of my cases two were treated for a long time for typhoid fever. In both the spleen was enlarged, when palpated very soft; in both the sensorium was half clear, and in one of the cases there were a few spots like roseola. Possibly for differential diagnosis here Bezold's statement is of value, namely, that the exudative otitides occur usually at the end of the third, or between the third and the sixth, week of typhoid fever. Bezold was able to find mention of only three occurring before the twentieth day. If the history, therefore, states that the acute otitis began first, and that the high temperature then occurred, with increase of the pain in the ears and the head, the diagnosis of sinus thrombosis is likely. In doubtful cases Widal's test may be tried, or it is possible that the continuous fever will change to an intermittent type.

Another disease which comes into question is pneumonia, especially when it develops simultaneously with the otitis or directly after.

The conditions are comparatively simple for the aurist if the pneumonia was diagnosed before. It is then perfectly clear that the height of the temperature is influenced by the pneumonia. If the temperature varies, or if rigors are present, then the condition is more difficult, and the attending physician is apt to believe that it must emanate from the ear. The following is a striking example:

A boy twelve years of age was taken ill on January 18, 1905, with measles and moderate catarrhal symptoms. The rash appeared on the 18th. The temperature was rather low, some-

what over 38° , and on the 20th fell to 37.2° . On the 21st, with a temperature of 36.5° there was some pain in the right ear. The temperature shot up to 40° , with a chill. On examination the hammer was red and the hearing^{*} was diminished. On the following day there was a chill, with a rise of temperature to 40.5° , which dropped to 37.6° in the evening. The entire drum was red and swollen. Carbolic acid-glycerin drops and hot applications were prescribed. On January 23d severe chill, temperature 40° , in the evening down to 36.7° . Pain in the left ear, slight redness, some cough. Some râles in the posterior half of the left lobe. On the 24th a chill with a rise of temperature to 40.7° . On the 25th the temperature rose to 40.5° again. The otitis media in the right ear is diminishing. The drum is only slightly red, lack-lustre. There is no pain in the left ear, the drum is red but not swollen. In the lower half of the right lobe posteriorly moderate dulness, crepitant râles, but no bronchial breathing. General condition excellent.

In the subsequent course the otitis gradually disappeared while the temperature kept its remittent character for three days, and then the crisis set in with subnormal temperature.

The absence of a marked dulness as well as the bronchial breathing made the general physician hesitate with the diagnosis of pneumonia. He was therefore inclined to ascribe the irregular course of the temperature to the otitis, while the reverse was the case. There was no spontaneous perforation and paracentesis was not performed.

The conditions are more difficult if the pneumonia is central and has not been diagnosticated. In this case the lungs must be examined carefully every day.

C. G., seven years of age, has just recovered from measles and the temperature has been normal for several days. There is some cough. On March 21st the patient appears poorly. On the next day there is some pain in the left ear with rise of temperature to 39.8° . On the 23d there is pain in the right ear with a temperature of 39.1° . Paracentesis was performed on the following day, bloody serous discharge. The temperature on the following morning dropped to 37.8° and rose to 39° in the afternoon. On March 26th it remained at 39.6° .

There was slight stupor, no headache, the mastoid processes were not tender. In the course of March 26th there was severe coughing, but not until March 27th did the daily examination of the lungs reveal pneumonia in the right apex, and on the same day the crisis occurred. The otitis was rapidly recovered from with normal hearing.

In this case there was pneumonia in the apex which did not become manifest until six days after the onset of the otitis media. I have observed similar conditions more frequently in the central onset in the lower lobes, especially in children. Some of the cases have recovered without leading to perforation or requiring paracentesis. In other cases the severe pain in the ears and mastoid tenderness led to paracentesis without exerting any definite effect on the temperature. The subsequently confirmed pneumonia explained the conditions. I do not believe that these cases should be regarded as complications of an ear lesion, at least that the intervening factor is not the sinus affection. I must add that in the other cases which I have seen no infectious disease preceded. Leutert has shown that erysipelas could lead to erroneous diagnosis. I have observed four cases of acute otitis media, with rigors and high fever as a complication, which were sent to me for operation. In all these cases the auricle was not invaded by the swelling, but the erysipelas extended over the scalp, with a prolongation over the mastoid process, causing swelling, redness, and pain simulating deep disease of the mastoid process. Rapid involvement of the auricle, usually on the next day, cleared the diagnosis.

Finally I want to mention the use of antipyretics as factors in rendering the diagnosis difficult. They may sometimes simulate a pyæmic temperature curve when there is no pyæmia. It is well known that antipyretics have this effect on some individuals, that the temperature after a fall rises with a rigor. Since the introduction of pyramidon in the treatment of typhoid fever, I have seen several cases where this temperature was complicated with otitis media. When the pyramidon was discontinued, the typical tempera-

ture curve characteristic for typhoid returned. Krannhals has shown by numerous investigations that these pseudopyæmic curves occur especially in inflammatory complications of typhoid, such as pneumonia plus otitis media. We must, therefore, remember that, especially in the last, the temperature is without serious significance.

REPORT OF THE TRANSACTIONS OF THE SECTION ON OTOTOLOGY OF THE NEW YORK ACADEMY OF MEDICINE

REGULAR MEETING, OCTOBER 11, 1906, DR. GRUENING IN THE CHAIR.

Presentation of Cases.

Fracture of the temporal bone by A. P. VOISLAWSKY, M.D.

R. H., admitted to the S. R. Smith Infirmary, Staten Island, on the 28th day of August, with history of having received an injury, being found unconscious, and brought in an ambulance. Physical examination revealed a bloody discharge from the right ear, which became purulent on the second day. Patient continued in stupor one week, during which time he vomited a great deal. A diagnosis of fracture of the base was made by Dr. Townsend, attending surgeon. It was a week before the patient asked for food. From the 8th to the 25th day he complained of headache at base and over right temporal region. Ear irrigated with bichloride, 1:5000 solution, three times a day. On the 25th day the attending surgeon noticed a slight swelling above the right ear, exceedingly painful to the touch. Temperature 100.2° , the first rise since admission to the hospital.

Patient was taken to the operating room, the right side of head shaved, and under cocaine anæsthesia an incision in the periosteum was made, two inches in length, and about an ounce of pus welled up. Upon cleansing, a marked fracture was visible, extending through the outer table of the temporal bone. Following this line of fracture, a probe was passed beneath the periosteum, and with the aid of a speculum could be plainly seen in the middle ear.

Had it not been for the infection, which was due to a purulent otitis of long standing, the fracture of the temporal bone would

not have been discovered. The patient made an uninterrupted recovery, and with the exception of the chronic middle-ear sup-puration the head symptoms have disappeared.

The case was shown simply as a fracture of the temporal bone extending into the middle ear.

Dr. PHILLIPS asked if he understood Dr. Voislawsky correctly in saying that except for the operation the fracture would not have been discovered. It was clear that from the beginning the symptoms pointed to a fracture of the base. Of course these cases are of comparative frequency—he had himself seen two within the last twenty days. One of these was a man who had been riding horseback and reached over to regain his stirrup, fell, and struck upon his head. He was found two hours later in a ditch by the roadside. He did not lose his consciousness but was unable to rise during that time, on account of a severe vertigo and vomiting, which continued for three days. He had a discharge of serum mixed with blood from the auditory canal. The accident occurred six weeks ago, and the man has now regained his equilibrium so that he can walk about. The bone conduction is absent on that side, and the external auditory canal reveals evidence of the fracture, which also must have extended through some portion of the labyrinth. The symptoms of vertigo and vomiting, and the bloody serum discharge were sufficient evidences of the fracture.

Dr. VOISLAWSKY replied that he had not presented the case as a fracture of the base, but for the fracture of the squamous portion of the temporal bone, which he thought was a rather unusual occurrence.

Demonstration of an improved motor drill for mastoid surgery. W. SOHIER BRYANT, A.M., M.D. *With two figures on Text-Plate V.*

The manner of using the apparatus was demonstrated on a preserved specimen. Dr. Bryant said that some of the best operators in this country and in Europe—among them Dr. J. ORNE-GREEN and Sir WM. MACEWEN—have used surgical drills to do a large part of their work, but this method has never been popular and has always been subject to a number of objections,—the chief is the mechanical difficulty of keeping the burr from heating and clogging. The present machine has some advantages over the older engines. There is a powerful motor, a flexible shaft which is detachable, a handpiece which can be detached

and sterilized, and a set of burrs which cut rapidly with an insignificant amount of clogging. There is also a foot switch in the circuit, which allows the surgeon to use both hands in manipulating the instrument, while the foot controls the motor; and a sterilized sleeve which is easily drawn over and tied to the flexible shaft. The motor is a powerful one-sixth horse-power motor of the Victor Electric Co., who also furnished the shaft and handpiece. The foot switch was added at Dr. Bryant's suggestion, and the burrs were made especially for him. With this instrument, the time for the removal of the bone in a mastoid operation is very much reduced, especially where it is hard or sclerosed. The surface left by the burr is smooth and needs no further treatment. The burr does not injure soft tissues unless they lie on a hard substance, therefore its use is not a menace to the structures adjacent to the operative field. It would not be wise, however, for a surgeon to attempt the use of the machine until he had previously tried it several times on the cadaver. The knack of guiding the burr is readily acquired.

Dr. DIXON took the time with a stop watch while Dr. Bryant performed a mastoid exenteration on a head with a large pneumatic mastoid. The time consumed in removing the bone, including the whole tip, one third of the posterior meatal wall, opening the cells which extended high and ran far back, and opening the antrum, was five minutes and sixteen seconds.

Dr. MEIERHOF said that he did not wish to condemn this appliance, but that the specimen on which Dr. Bryant had made the demonstration was a rather porous mastoid and it required a certain amount of pressure to make it cut through the bone, and personally he preferred the old methods rather than to trust to so powerful and dangerous an appliance. After the bone had been cleared away, this might be very well for cleaning away all sorts of recesses, but it seemed dangerous to go in with a large burr and remove the cortex in one sweep, as had been done in this demonstration, and he did not feel inclined to use the apparatus.

Dr. COBURN inquired whether the bleeding was increased or diminished.

Dr. GRUENING inquired whether the burr would jump.

Dr. BRYANT replied that he had not noticed that the bleeding was affected one way or another; and that the burr would jump,

but that this could be so guarded against that no injury would result.

Demonstration of the movements of the Eustachian tube. W. SOHIER BRYANT, A.M., M.D.

Demonstration of a new gas-ether inhaler. By V. C. PEDERSEN, M.D.

Dr. Pedersen presented a new form of bag inhaler for etherization and its sequences, in which by the principles of evaporation and unobstructed respiration the patient is relieved of additional work in breathing.

A full description of this inhaler will appear shortly in one of the medical journals.

Case of mastoiditis due to Friedlander's (?) pneumococcus. GEORGE SLOAN DIXON, M.D.

Dr. Dixon said that in May, 1905, he had reported to the Section a case of meningitis following middle-ear disease with mastoiditis, the infection in which was stated as Friedlander's pneumococcus. This report was published in the ARCHIVES OF OTOLGY under the title of "Report of a Case of Panotitis Resulting in Meningitis, with Pathological Findings." In closing this report he made the statement that the case seemed to call for an investigation of his bacteriological examinations during the previous four years, and quoted as follows :

"These were found to comprise about 1050 cases of acute and chronic purulent otitis with and without mastoiditis : 2.75 % of the infections were Friedlander's pneumococcus, or more properly the bacillus mucosus capsulatus ; fifteen cases, or about 50, had existed forty-two days and over before operation. Of these, two had perisinuous abscess with Bezold perforation ; one had perisinuous abscess and cortical perforation with subperiosteal abscess ; four had epidural abscess, one of which died of meningitis ; one had panotitis and died of meningitis ; and one had brain abscess, which also died ; six cases had subperiosteal abscess.

"Of those cases which had existed under forty-two days, four promptly recovered after paracentesis, but mastoid operation was required on the remaining ten, and all did well except one patient who died of pneumonia."

Dr. Dixon stated that he had been observing these cases for several years and was struck with the frequency with which this germ gave serious trouble, and wished to call attention to a case

which he regards as a type of this particular form of infection.

He further noted that this germ was very likely to be present in diabetic cases.

Authorities seem to be confused as to what is Friedlander pneumococcus and what is encapsulated streptococcus. Some say that Friedlander's pneumococcus is decolorized by Gram, and some that it is stained by Gram. Some figure it appearing as a streptococcus, another will call it a coccus, and another a bacillus,—but the fact remains that the germ under consideration appears to fit the description closely enough to class it under *bacillus mucosus capsulatus*, and in some respects resembles the Friedlander type.

It is still being studied, and the present report is preliminary to the completed investigation which will be published later.

This particular case occurred in the practice of Dr. John L. Adams, and in a manner is typical of this form of infection. Of course there are deviations occasionally, as in all other types.

Mr. C., a retired merchant, sixty-one years old, presented himself for treatment at Dr. Adams's office, and a short time after, *viz.*, July 13th, entered the New York Eye and Ear Infirmary for observation.

The *membrana tympani* of the right ear showed a perforation which had been present since infancy, and the hearing on that side was poor.

He had suffered from indefinite pain in the left ear for six months, but a week before he was seen by Dr. Adams he began to have severe pain, deafness, tinnitus, and tip tenderness on that side. Myringotomy had recently been performed, and there was profuse discharge.

Physical examination was negative.

When he entered the infirmary a second paracentesis was done, he was put to bed on liquid diet and irrigations with warm boric acid solution ordered. No ice was used.

His temperature in the morning of the 13th was 98.2° , in the evening 98.6° , with respirations 18, pulse 70 to 72.

On the 15th of July pus from the left canal was examined and a form of streptococcus found. On the 19th the pus showed the same except that the germs seemed to be fewer in number. On the 20th a germ similar to Friedlander's pneumococcus was found, and Dr. Adams was notified at once.

A blood examination made later in the day showed Hb. 85%, red cells 5,300,000, white cells 15,700; differential count, small

mononuclear 9.4 %, large mononuclear 6.2 %, transitionals 2.8 %, polynuclear 81 %, eosinophiles .4 %, and mast cells .2 %.

Dr. Dixon thought that the mastoid should be opened at once. Of course Dr. Adams demurred, as would most surgeons who had not studied the ravages of this germ, and very properly wished further consultation. Dr. Dixon said that he did not expect to find any one who would agree with him that the case should be operated immediately, even with a polynuclear count of 81 %, as it was quite common to see recovery without mastoid operation in other forms of infection where the polynuclear count was 80 or 81 %, with a leucocytosis of 16,000 to 17,000. He does not think that leucocytosis alone amounts to much as a diagnostic factor in mastoiditis,—but that the polynuclear percentage is important.

In the afternoon of the 20th, Dr. Adams called in Dr. Robert Lewis, Jr., and Dr. Dixon. They found the temperature, pulse, and respiration normal. The mastoid tenderness and pain had disappeared, and the hearing on the affected side had improved, but the upper posterior portion of the canal-wall was red and sagging, and the membrane had a red, "beefy" appearance. The discharge was profuse. Dr. Dixon recommended immediate operation, Dr. Lewis was not in favor of this, and Dr. Adams agreed with Dr. Lewis.

The patient wished to know whether a delay of twenty-four hours would make any difference. Dr. Dixon thought not, and it was decided to wait that length of time.

The next day, the patient's condition was the same, and Dr. Dixon still held to the propriety of an operation, basing his opinion principally on the nature of the infection which had been subsequently reinforced by the polynuclear percentage, and the appearance of the canal and membrana tympani. The patient was operated on that afternoon, and the following condition was found:

The subcortical tissue was found as a mass of purulent broken-down bone-cells. The mastoid tip, median groove, antrum, zygomatic root, roof of the antrum and aditus, and cells above the knee of the sinus were all diseased and practically liquefied. The whole was removed with a curette down to the inner plate and sinus groove which was of healthy hard bone. The mastoid tip had to be entirely removed, as also the roof of the attic and antrum, exposing the dura over an area of about 20mm.

The patient made an uninterrupted recovery.

Dr. Dixon believed that if the patient had waited another twenty-four hours meningitis would have supervened.

In conclusion Dr. Dixon said, we have a number of such cases at the infirmary. The ear symptoms may not amount to much, or the pain may be at first severe. All acute symptoms may subside, and the patient thinks he is doing well, but the discharge continues, as a rule. After going on this way for a considerable time, say four to six weeks often, the patient thinks something ought to be done to stop the discharge, or improve the hearing, as in the case I reported in 1905. That patient had passed the acute stage and was being treated in a surgeon's office for the resulting deafness. She was suddenly seized with dizziness and was taken to the infirmary. Aside from the dizziness there was nothing to indicate the possible necessity of operative interference. Suddenly, however, the temperature went up, and before anything could be done meningitis had developed and the patient died in thirty hours. The autopsy showed all portions of the bone badly involved.

It must be borne in mind that Dr. Adams's patient was improving. He had no pain, no temperature, pulse and respiration normal, mastoid tenderness had been present but had disappeared, and the only indications for operation were the presence of the encapsulated germ, the sagging of the canal-wall, and the polynuclear count of 81%.

In concluding, Dr. Dixon said that another case had been brought to his attention to-day which fits in so well that he must mention it. A patient called at the office of Dr. Whiting, and when the mastoid was pressed to elicit tenderness the thumb went through the cortex. The patient still declined operation because there was no pain. A few hours later the mastoid was opened, however, and was found to be practically liquid. It was another case of the same kind of infection.

Dr. MEIERHOF said that the Section was under obligations to Dr. Dixon for presenting this phase of the importance of bacteriology in purulent otitis. Dr. Dixon's laboratory was practically a clearing-house for a large number of such cases. All the cases in the New York Eye and Ear Infirmary passed through his hands. There are some otologists who, while they will have a bacteriological examination of the pus made, lay very little stress upon the value of the examination, and in some cases

where a streptococcus infection is found they attach no more importance to it than to any benign infection. In the cases just presented by Dr. Dixon one could see certain definite results following this form of bacterial invasion, and it places the bacteriology of the discharge of the ear on a much more definite basis. When the value of a particular form of invasion is known, it forms a valuable guide for treatment, in spite of the fact that the typical symptoms may not always be present.

Dr. BRYANT said that he regretted he had not known that Dr. Dixon was going to present this subject, as he would have liked to have looked up some memoranda of similar cases which he had seen and operated upon. His experience with this variety of infection had been similar to Dr. Dixon's, and all his cases had been very grave.

Dr. GRUENING inquired whether there had been applications of ice, as this might in a measure account for the anæsthesia. Dr. Dixon had said that the swelling of the canal remained and also the sagging of the upper walls, yet they were cases of retention of pus, and the tenderness had disappeared. This sometimes happens under the application of ice, and should always be considered in connection with these cases. He himself had not laid much stress upon the importance of bacteriological examinations, as he felt that a clinical examination sufficed in the majority of cases. The bacteriologists at Mt. Sinai Hospital claim that the pus from the discharge is almost always contaminated, and prefer to wait until the ear is opened. Dr. Gruening felt that the clinical examination was much more important than the bacteriological examination, but if the latter adds important knowledge in forming a diagnosis we should certainly avail ourselves of it.

Dr. DIXON replied that he did not think ice had been used in the case. He admitted that the discharge from every ear was contaminated, but if we found a rapidly growing streptococcus infection it was certainly more virulent than an ordinary pneumococcus or staphylococcus infection. Of course, if we undertake to cultivate and isolate all the germs found in every case of otitis media, a small army would be required to do the work, but every day in the New York Eye and Ear Infirmary he was impressed anew with the practical and useful side of bacteriological examination of smears of the secretion from the ear.

As to this patient, he had no temperature, could hear better, and everything pointed to his well-being and the resolution of

the case. It was doubtful whether many surgeons would insist upon the necessity of a radical mastoid operation in an important case where the patient seemed to be getting well. He would not be willing to do it himself unless there was something to back him up. The cases which he had spoken of were only three out of a dozen or so that he had noted within a very short time. There had been many more lately, and they were all of that peculiar type, the mastoid cells could simply be "scooped out." In such cases, when meningitis occurs—which is very likely to follow—the course is very rapid, the patients sometimes dying within a few hours, sometimes within thirty hours after the onset of the fever. In cases of this type it was important to know that one germ could be picked out which was likely to cause much trouble, and when that is present perform an exploratory operation. The speaker maintained that it made no difference what condition the patient was in, if the discharge continued and was found to contain this encapsulated germ, the mastoid should be opened.

Dr. GRUENING said that he was struck with the fact that in all these cases of infection with Friedlander's bacillus there had been no tenderness in the mastoid. It was known to all that there may be cases with swelling of the drum, bulging and sagging of the canal, and yet without fever or headache, or any other symptoms but persistent tenderness, and that alone would in some cases be a guide for operation. He would operate at times where there was persistent tenderness. If a case ran along without this tenderness we should lose an important diagnostic symptom, and he would like to know if he was correct in understanding Dr. Dixon to say that none of these cases showed any tenderness.

Dr. DIXON replied that in a certain proportion of the cases there was absolutely no tenderness; but in others there would be a certain amount of tenderness, and in these there was found great destruction of the bone. Not all the cases were absolutely anæsthetic. It might be possible that this lack of tenderness was due to the germ being able to manufacture some kind of anæsthetic, which, after a certain time when the acute symptoms subside, would cause anæsthesia, and though the trouble was still going on, no tenderness could be elicited.

Dr. GRUENING said that at one time he had maintained that persistent tenderness was a guide, and he had sometimes failed

to operate because no tenderness could be noted, but quite a number of mastoid bones are so formed that the tenderness cannot be elicited. The cortex may be very thick and the cell very far from the periphery; the cell may be filled with pus; and this happens in old people whose cortex is very thick.

Report of a case of purulent meningitis following a radical mastoid operation. Recovery after operative interference. Drs. HELD and KOPETZKY. Published in full, pp. 531-543.

Dr. PHILLIPS said that naturally he had been much interested in this case and had watched it carefully, and felt compelled to admit that, notwithstanding the fact that he was on record as an unbeliever in the recovery of cases of purulent meningitis of otitic origin, this was a genuine case of recovery. He had seen this patient within twenty-four hours after the first symptoms appeared, and she presented all the characteristic symptoms of purulent meningitis, and he had given the opinion that it would be a fatal case. Drs. Held and Kopetzky, who were present, then suggested that if this were the feeling it might be well to undertake a very radical course of treatment. This was readily consented to, with the result just heard.

In his opinion there could have been but two other conditions present, rather than the diagnosis which had been made. It might have been a simple subdural abscess, or it might have been a case of epidemic cerebro-spinal meningitis, from which recoveries have been reported. He thought, however, that the report from the ventricular and spinal fluid negatived the diagnosis of subdural abscess; and the fact that the characteristic germs were not present except at one examination would discard the diagnosis of cerebro-spinal meningitis.

There were one or two points he wished to emphasize, the most important being the attempt to remove the fluid from the ventricle. He hardly saw the necessity for doing so in this case, and rather felt that the importance of this procedure was overestimated. It is not unattended with danger. He had had occasion, at about the same time this case was under treatment, to remove the ventricular fluid from a patient who was practically dying. A small portion of fluid was removed for purposes of examination, but he felt that the death of the patient was hastened, and at the post-mortem examination which followe

it was found that a blood-vessel had been wounded and a hemorrhage into the ventricle had taken place.

Dr. HARRIS said that he did not think this report should be allowed to pass without additional commendation. It seemed to him to be one of the most carefully prepared reports that he had heard for a long time, and he wished to congratulate the authors upon their success in a case of so much importance. He did not think that this subject was receiving sufficient attention in this country. We have many forms of meningitis, and are inclined to treat them too pessimistically; but in Germany they have recognized the possibilities that the essayists have brought out to-night. This has been demonstrated in Politzer's clinic, and Alexander reports a series of cases cured of purulent meningitis, about fifteen in number.

At the same time, even with such strong facts as had been brought out by the essayist, he remained sceptical, as he could not reconcile a cure with the appearance that he had many times seen of purulent meningitis upon a cadaver. It seemed to him that in a case of established purulent meningitis the conditions are such that no operative procedure can be of any avail. This opinion, however, did not make him feel that the course which had been pursued in the case just reported was not the correct one, for he believed it had been demonstrated very clearly that any meningitis demands such a course where there is the slightest hope of a recovery. We have too often erred on the side of conservatism. He hardly agreed, however, with the weight that Dr. Kopetzky attached to the value of lumbar puncture. As he had watched the results obtained in our own city and also abroad, it seemed of very doubtful value. We could only claim that it has a certain diagnostic value. As a therapeutic agency he doubted whether Dr. Kōpetzky had gained anything more than the relief of pressure, which could have been secured in other ways, such as opening the mastoid and eliminating the field of infection, together with opening the dura and letting out the cerebro-spinal fluid.

Dr. HELD, referring to the remarks that had been made in regard to the danger of ventricular puncture, said that when the puncture was done sufficiently low and in the descending horn of the ventricle, there did not seem to be any probability of injuring the middle meningeal artery. The question brought up by Dr. Harris as to the therapeutic value of lumbar puncture

could not be unquestionably agreed to. It seemed reasonable that it was done, not only to relieve the pressure, but by the removal of this fluid a new fluid was caused to be formed which had more or less bactericidal power, and thus contributed to the cure of the meningeal disease.

Dr. KOPETZKY, in closing the discussion, said that the possibility of a subdural abscess had been absolutely ruled out by the finding of pus in the ventricle. In drawing the pus from the ventricle a canula had to be used; the pus in the ventricle was not connected at all with that under the dura; there was no fistula apparent. Of course there always was danger in performing ventricular puncture—the middle meningeal artery might be wounded; but the procedure was safe if you entered the descending horn of the ventricle. As to the condition of cases seen on the autopsy table, they were not the ones by which to judge of pathological findings in the meningitis of the living. Moribund cases, or those which are about to go on to exitus, are not the ones upon which an operation is suggested, but rather upon those in which the complications were just beginning, and where the picture presented demonstrates a meningitis. Here results can be obtained. This has been established by the work of Macewen, Alexander, and the others who had been quoted. If only one case is saved, it is well worth the attempt. The saving of the life of this little child is well worth the effort made.

In any given case of lumbar puncture the significance of the findings varies, but at least one can, by this means, keep the intracranial pressure down—can keep the general condition good, and gain time, and with a local counter-opening you can give nature a chance to assert herself, and the patient may recover. In this, however, as in any other procedure, the interference must be prompt, and should not be delayed until the brain and meninges were too deeply involved.

REGULAR MEETING, NOVEMBER 8, 1906, DR. E. GRUENING, PRESIDENT, IN THE CHAIR. DR. W. H. HASKIN, SECRETARY.

An unusual type of acute mastoiditis. C. G. COAKLEY, M.D.

D. S. female, twenty months old, was referred to me on the evening of April 17, 1906, by Dr. E. FOSKETT of this city. The mother stated that the child had been perfectly well until the

day before, when she noticed a marked swelling behind the left ear. The child had eaten and slept well but apparently had a slight fever. Examination showed a well-nourished child with a mass behind the left ear in the mastoid region. The auricle stood out at nearly right angles to the skull and at first glance presented the typical picture of a mastoiditis that had perforated the cortex with pus formation beneath the skin. On palpating the mass, however, it was found practically not to be tender, of extreme hardness, no fluctuation, nor pitting on fairly firm pressure, skin very slightly movable. The mass seemed to be confined to the temporal bone, its maximum prominence just above the level of the external auditory meatus. From here it extended upward to the temporal region in front of the auricle, fading away above at the upper limits of the temporal bone. There was no redness of the overlying skin. Examination of the drum membrane showed the least suspicion of hyperæmia, but without bulging. The right drum membrane was normal in appearance, nose and throat normal. Temperature at the time of examination was 102° , pulse 140. The absence of any systemic symptoms, the slight involvement of the drum, and the dense hardness of the mass were very different from the ordinary picture of mastoiditis. On the morning of April 18th, Dr. Robert Lewis, Jr., saw the patient. The swelling behind the ear at that time was somewhat less, still the same slight hyperæmia of the drum and a slight bulging posteriorly and superiorly. He advised incising the drum, which I did under chloroform anæsthesia. The canal was thoroughly sterilized with a solution of bichloride followed by alcohol, and a free incision made in the posterior half of the drum membrane. There was practically no bleeding, merely the escape of a small amount of turbid, gelatinous secretion which was collected on sterile cotton, spread on slides and submitted to Dr. E. K. Dunham for microscopical and bacteriological examination. Dr. Dunham reported a mucoid secretion with few pus cells and a pure culture of a germ which had all the appearances of the *influenza bacillus*. The child was taken home with instructions to irrigate the ear with hot 1:5000 bichloride solution every two hours and to apply hot applications in the form of a poultice behind the ear.

On April 19th the child was brought to my office. Rectal temperature had risen to 103° ; no pain. Dr. Foskett reported

that at the first irrigation only was there any discharge with a small amount of stringy, mucoid material; subsequent irrigations brought nothing from the canal. The swelling behind the ear was of the same size and hardness as when first examined, and with a faint redness of the skin probably owing to the poulticing; practically no tenderness on pressure. In view of the temperature and high pulse rate, ranging from 140 to 160, the mother was advised to have an exploratory incision made with a view to determining the nature of the process, which in all probability was an atypical mastoid involvement. As the mother had herself been a victim of acute mastoiditis, for which she had been operated with the result of total destruction of hearing on the affected side, she said she would rather see her child dead than undergo such an operation attended with loss of hearing. Although I explained the dangers of letting such a condition go without operation, no persuasion on my part could induce the parents to allow the child to be operated on. The mother then took the child to the New York Hospital where it was kept under observation until April 23d. I am indebted to the New York Hospital for the following extracts from the record: Temperature varied on April 19th from 104° at 2 P. M. to 103.8° at 5 P. M. and 104.8° at 6 P. M. The ear was irrigated; a small mucous clot came out. On April 20th, the temperature ranged from 103° at 4 A. M. down to $100\frac{1}{2}^{\circ}$ at 6 P. M. The ear was irrigated, no pus or mucous; slept fairly well, no nourishment taken. On April 21st, the temperature ranged from 102° to $101\frac{1}{2}^{\circ}$, leucocytes 15,000, polynuclear 71%. On April 22d, the temperature ranged from 101.8° in the morning to 100.6° at night. Swelling behind the left ear shows slight tenderness, discharge from left ear moderately profuse; diagnosis mastoiditis, and on April 22d the surgeon at the New York Hospital strongly advised a mastoid operation, but again it was refused and the child was removed from the hospital to her home.

Dr. Foskett saw the child on April 23d and gave me the following history: Temperature at 3 A. M. 103.2° , 11 A. M. 102.3° ; left ear discharging freely; swelling behind ear somewhat reddened, slightly tender; child very restless at night, complaining of some pain in *right* ear. I saw the patient on April 24th at noon. Temperature 105° , moderate redness, slight tenderness of swelling behind left ear, considerable purulent discharge from left canal. Right drum membrane red, bulging in posterior and

superior portions. Immediate operation was advised, to which the mother consented.

Operation at 3 p. m. Usual incision behind left ear. After incising skin, knife passed into a rather dense infiltrated area of about the consistency of untanned leather which practically did not bleed. The maximum thickness of this infiltration opposite the external auditory canal was $\frac{5}{8}$ of an inch. On peeling the periosteum forward and backward the ordinary shaven-beard appearance at about the middle of the mastoid area was seen with a perforation of the cortex $\frac{1}{4}$ of an inch in diameter. No pus or softened area was found along the track of the incision or between the periosteum and bone. The whole of the mastoid cells were infiltrated with a gelatinous, ropy mucoid material; the bone was soft and easily removed with curette. The mastoid cell area extended rather far posteriorly, and anteriorly into the zygomatic process. The inner table of the mastoid was not softened in any place. The sinus was not exposed. The wound was packed with iodoform gauze, sutures taken in upper and lower angle, ordinary aseptic dressing applied. Smears were made from the secretion in the mastoid and sent to Dr. Dunham for examination. He found, as in the first examination of the discharge, a very small proportion of pus cells, considerable amount of mucus, and a pure culture of a germ which had all the appearances of being the *influenza bacillus*. A free incision was made in the right drum after sterilizing the canal. A couple of drops of ropy muco-pus exuded. Smears from this showed pus and diplococci. The right ear continued to discharge for about two weeks. The patient's temperature remained in the neighborhood of 102° for two days and then dropped to normal and stayed so. Sutures were removed on the fourth day, packing on the 6th. It was found that the infiltration external to the bone had absorbed without breaking down. On May 11th the wound had completely cicatrized. The child's hearing is perfect in both ears.

Dr. GRUENING said that these granulomata were frequently seen after mastoid operations in children that were not well nourished or well cared for, and that he was loth to accept the diagnosis of syphilitic granuloma for such cases. He had seen many of them get well without antisyphilitic treatment, and supposed that others had also. This little girl was the child of healthy parents, and showed absolutely no trace of syphilis.

There was merely a wound that did not heal, and this was not altogether unusual.

Dr. COAKLEY said that even after the head was shaved he could not tell from the feel of the mass that it was soft tissue, or that the whole outer table of the mastoid had been pushed out—there was such a large mass between the bone and superficial skin.

Dr. ROBERT LEWIS, Jr., said that he had seen Dr. Coakley's case, and that the feature of interest in it was the bone-like hardness of the infiltrated area behind the ear; it seemed more like an osteoma than like œdematous tissue.

Dr. A. A. BERG reported a case of **otitic abscess in the left temporo-sphenoidal lobe**. Mrs. F., forty-two years old, German, married, had suffered from a left-sided chronic otorrhœa for many years; the discharge from this was never very profuse; it was intermittent, and of a sero-purulent character; she never had any pain in the ear or mastoid region. There had been no ear discharge for a number of weeks prior to the present illness. On May 5, 1906, she suffered with headache, nausea, vomiting (the latter not projectile in character). She had no dizziness, fever, or chills. Between May 5-20 she was more talkative than usual, but was always rational. On May 20th, at breakfast she complained of headache. By the afternoon she had forgotten people's names; there were no convulsions. She vomited once (not projectile). In the evening she could hardly speak at all. Dr. B. Sachs saw the patient in consultation with her physician, Dr. Charles Goodman on May 23, 1906. He found the patient in a condition of semi-stupor, with slight rigidity of the neck, a slight degree of left facial paralysis, and some weakness of the right upper and lower extremities, and with increased reflexes in the right arm and leg. The pupils were equal, and reacted to light; there was no paralysis of the eye muscles, but there was a slight optic neuritis.

The semi-stuporous condition was found by Dr. Sachs to be due largely to an entire inability of the patient to comprehend speech. Spontaneously she spoke correctly enough, but occasionally used words which she did not intend to use. There was no ear discharge, though there were a number of old scars on the left drum membrane.

The history of chronic otorrhœa, the optic neuritis, the headache, and vomiting led Dr. Sachs to diagnosticate a cerebral abscess. The sensory aphasia led him to locate it in the temporo-

sphenoidal lobe, and the weakness of the right upper and lower extremities, and the increased reflexes therein, together with the paraphasia and the absence of convulsive seizures, induced him to believe that the abscess was encroaching upon the fibres leading from the motor centres—in other words that the abscess was a subcortical one in the temporo-sphenoidal lobe.

At the time of operation these diagnostic points were all substantiated.

Operation, May 24, 1906.—Though there was no external evidence of mastoid affection, this bone was first of all exposed and opened. All of its cells had been obliterated, and its structure was sclerosed and very dense. The sinus was exposed, and was seen to be about $\frac{1}{8}$ of an inch behind the posterior wall of the bony meatus; the antrum was entered with a probe, but its complete exposure would have entailed a very slow and laborious dissection of the sinus, and, in view of the fact that no evidence of disease was seen in the mastoid or antrum, it was decided to at once proceed to deal with the cerebral condition. The mastoid incision was therefore prolonged upward and forward in a curved direction, so as to expose the squamous portion of the temporal bone, and the soft parts and periosteum were reflected from this for a space of about $1\frac{1}{2}$ inches in diameter. Starting from the roof of the antrum and tegmen tympani, the squama was removed with chisel and rongeur forceps over an area as outlined above. There was no visible cerebral pulsation and the dura bulged considerably. With a large-sized trocar aspirating needle, a puncture was made into the temporo-sphenoidal lobe, about 1 inch beneath the cortex. About 2 drams of sero-turbid fluid were first aspirated, and then thick, creamy pus. The needle was left *in situ*, the dura incised for about $\frac{1}{2}$ inch alongside of the needle, a grooved director passed along the needle into the abscess cavity, and then the opening enlarged with a dressing-forceps. About two ounces of thick, creamy pus were evacuated. Drainage at the most dependent point by soft-rubber tube and two narrow strips of plain sterile gauze; closure of soft parts down to emergence of drain; dry aseptic dressing. The patient was not at all shocked by the operation. There had been very little hemorrhage.

The next morning the patient's sensorium was much clearer; she was able to talk and recognize familiar objects, though unable to name them. In the afternoon she was able to name

some things. Rapid recovery took place. In *forty-eight hours the aphasia had almost entirely disappeared*, likewise the weakness of the extremities and the left facial paralysis. The drainage tube was removed after ten days, the abscess cavity rapidly contracted, and the patient was discharged cured after three weeks. At present she feels entirely well. There is no ear discharge. The defect in the squama of the temporal bone has been almost entirely filled in by new bone. There is no hernia cerebri.

Comments.—From a neurological point of view the case is of interest :

1st. Because of the rapid recovery of speech after the evacuation of the abscess.

2d. Because the abscess corresponds in every way to clinical findings prior to operation. Dr. Sachs especially insists upon the presence of sensory aphasia for the diagnosis of left-sided temporo-sphenoidal abscess. He further insists that this symptom should always be especially examined for, and that the physician should not be deceived as to the absence of aphasia by the fact that the patient is able to talk coherently. This symptom, he is of the opinion, cannot be made out unless it is specially examined for.

From a **surgical** standpoint the case is of interest because it enables us to open a discussion as to the best manner of approaching and draining temporo-sphenoidal abscesses and cerebral abscesses in general.

The two cardinal requisites for the successful surgical treatment of cerebral abscess are (*a*) free exposure of the area in which the abscess lies, and (*b*) drainage of the abscess cavity at its most dependent point. In the present accepted fashion of operating upon temporo-sphenoidal abscesses both of these prime conditions for success are easily and readily fulfilled. The old route for access to the temporo-sphenoidal lobe of Macewen, viz., through the squama of the temporal bone, proved itself insufficient because of the fact that, through this exposure, drainage of the abscess cavity could not be effected at its most dependent point. Körner's original operation, viz., through the roof of the attic and tegmen tympani, was similarly unsatisfactory, because, though it sufficed for drainage at the most dependent point, it afforded insufficient exposure of the affected brain area. The combination of both these operations, viz., removal of the roof of the attic and tegmen tympani and enough of the squama

for a free exposure of the temporo-sphenoidal lobe (the operation of Macewen), fulfils both requisites for successful treatment of temporo-sphenoidal abscess.

It is different, however, with abscesses which are situated in one or another of the cerebral lobes nearer to the vertex of the skull. The surgeon in such cases trephines over the site of the abscess, and, after evacuation of the pus, has to drain the abscess cavity up-hill. Under such conditions there is, of necessity, retention of pus in the cavity, and the latter tends to burrow, and gives rise to secondary pus formation. This accounts for the far less favorable results which surgery achieves when we have to deal with abscesses situated in the higher parts of the brain. Inasmuch as lowering the head cannot be tolerated by the patient long enough to satisfy the requisite of good drainage, and inasmuch as the present method of draining such abscesses is insufficient, it is necessary in such cases to make a counter-opening through the skull and brain tissue over the most dependent part of the abscess cavity and establish drainage through such a counter-opening. This procedure has, as far as I know, not yet been practised, but I will certainly do it in the next case of this kind I am called upon to treat.

Discussion on Dr. A. A. BERG's case of **temporo-sphenoidal brain-abscess**. Operation by Dr. E. GRUENING. Recovery in three weeks.

Dr. MCKERNON said that when this matter was discussed last year before the Academy, the five otologists who spoke said that they did not drain through the roof of the antrum or the tympanic cavity. Certainly he himself never did. He regretted very much that he had not arrived in time to hear all of Dr. Berg's report, but there was one point to which he took exception, namely, that there was no danger of hernia cerebri when a large area was exposed. He thought there was danger of having an infection take place, for a hernia cerebri is due to infection, and there is this danger when a very large area of bone is removed. It had occurred in some of the cases in his service, but not frequently.

Dr. GRUENING said that he had seen the patient, and she had certainly made a very good recovery. The wound was entirely closed, and there was no discharge. The patient was perfectly well. The general surgeon supposes that the otologist only goes into the abscess of the brain through the antrum roof and

tympanic roof, but this is not the case. The otologist has good results, because he does open the abscess freely and removes the squama of the temporal bone as well. He does not dwell upon that, however, but upon the fact that he drains by gravitation. The drainage which Dr. Berg proposes to employ in these cases is possible, as is evidenced by our cases. We often find it necessary to go through healthy brain tissue in order to reach the abscess, and then drain it through this route, and no harm results. There is no reason why a similar opening might not be made from the side in order to drain abscesses developing in other parts of the brain. As to the optic aphasia, this is only found when the abscess is in the temporo-sphenoidal lobe of the left side. He thought that in all cases reported by otologists this symptom had been noted. Sensory aphasia is easily discovered. Patients speak very fluently of things which concern them and others, and also mention things they cannot see, but they cannot name the things that they do see. They may speak of a watch, a glass, or a pencil, but if you show them these articles they cannot name them.

Dr. Gruening said still that he wished to emphasize the point that otologists do not confine themselves to opening an abscess merely through the tympanic cavity and the antrum roof.

Dr. DUEL said that in all the cases where he had operated he had removed the squama, and approached the abscess through that portion of the dura. Experience had somewhat altered his judgment in regard to the opening of brain abscess cavity. He now felt that turning back a large flap of dura was a frequent cause of hernia cerebri, and advocated a small opening through the dura into the abscess cavity, if possible, leading from the point of infection through the "stem" caused by the adhesion of dura to the underlying membranes into the cavity.

Dr. LEWIS said that he always removed a sufficiently large portion of the squama, so as to obtain plenty of room for operative procedure. In going through the dura he generally made a curved incision, which tended to prevent a hernia cerebri. He generally sewed up a portion of the dura, putting in one or two sutures.

Dr. KENEFICK said that he noticed that Dr. Berg spoke of drawing the fluid from the abscess cavity by a syringe. This point had been discussed at otological meetings, and it had been agreed that it was possible to encounter pus of such consistence.

that it would not enter the needle of an ordinary syringe. Another point which should be mentioned in connection with abscesses in this region was the possibility of a secondary or multiple abscess. It has happened several times in the last few years that multiple abscesses have been overlooked.

Dr. EAGLETON said that Dr. Berg had spoken of removing three ounces of pus, and in an abscess of that size it would not be overlooked. It had been his unfortunate experience to attempt to drain an abscess by the upper route and to miss the abscess. That would not have been possible had he opened the tympanic bone and gone in below. At that time it was the teaching of Macewen to make a large flap. These cases can only be successfully reached by going through the tegmen tympani.

Dr. BERG said that he was greatly indebted to the members of the Section for the free discussion of the case and for the number of points that had been brought up. As to the question of aspirating with a needle, he thought it a great mistake to use a fine needle. The one he used was practically a trocar, and no pus could fail to enter it. If a needle of that calibre were not available he would make use of a scalpel. As to a hernia cerebri developing after the operation, he had understood Dr. McKernon to say that it only develops after infection, and would like to know to infection of what structure he referred.

Dr. MCKERNON said that hernia cerebri does occur after infection in a great many cases, and certain authors have claimed that it only occurs after infection of the cerebral substance.

Dr. BERG replied that infection of the cerebrum would undoubtedly give rise to hernia cerebri, and that he had seen it several times.

In reference to secondary abscesses that were undrained, he did not see how, with a single abscess of the brain properly drained, at its dependent point, there could be any development of a secondary abscess.

With regard to the size of the opening in the bone, he did not think it mattered how much bone was removed. He had removed as much as four or five inches of a skull, and had used no care to make it of any particular shape or size. He thought that the shape of the incision into the dura was immaterial. It should not be made any longer than is essential for the draining of the abscess.

As to the point brought up by Dr. Gruening, the original method of drainage taught by Macewen was through the squamous portion of the temporal bone. This was rejected by Koerner, who went in through the roof of the antrum, and the tegmen tympani, and it was not until Macewen added to the removal of the roof of the antrum and tegmen tympani the simultaneous removal of the squama that Koerner altered his operation and accepted the Macewen method. Dr. Sachs doubtless had reference to Koerner's original method in his discussion last spring. Dr. Sachs advocates a large opening both for free exposure and for free drainage, and the latter at the most dependent point.

As for missing small abscesses by going in at the upper route, he thought Dr. Eagleton was right, but Koerner suggests that abscesses of the brain are usually close to the bone that has given rise to them. It is his idea that they are due to trouble in the tegmen tympani or roof of the antrum.

Dr. WIENER said that Dr. Berg deserved congratulations for the successful outcome of this case. He thought that the recognition of symptoms which would point so accurately to the localization of an abscess should be noted. The presence of sensory aphasia, the hemiparesis, and the absence of all convulsive seizures of either the general or the Jacksonian type pointed to the temporo-sphenoidal lobe and to its subcortical position. An important point was the presence of the sensory aphasia. A great many cases occur in which, if we would make a more accurate examination, this symptom might be demonstrated. There are cases in which the patient is said to be stuporous, dazed, or bewildered, and yet, if an accurate examination were made and this symptom looked for, it would be noted. In the present case the accurate localization was due to the fact that the symptoms pointed directly to the location of the abscess, and were recognized.

Dr. HERMAN KNAPP inquired whether the eye had been examined, and Dr. BERG replied that there was a very slight optic neuritis discovered. Dr. KNAPP said that examination of the field of vision was frequently of advantage, as hemianopsia indicated an interruption of the optic tract.

Report of a case of thrombosis of the lateral sinus and complete obliteration of the internal jugular. EMIL GRUENING, M.D.

The patient was a young girl sent to the hospital by Dr. H. W. Berg, who had seen her in consultation. She had symptoms which he recognized as due to thrombosis of the lateral sinus, and he sent her to Mt. Sinai for treatment.

The patient gave a history of having repeatedly had a temperature of 106° and more, oscillating to normal, and accompanied by chills and vomiting. In the intervals between the attacks she seemed to be quite well. She said she had had no discharge from the ear so far as she knew. Two weeks previously the ear had pained somewhat, and then the chills and vomiting occurred.

The ear was examined and showed a small opening in the drum, but no discharge. The mastoid was not tender. The pupils were irregular, one being wide and the other small, and there was a pronounced optic neuritis; the neck was tender and there were large glands near the jugular vein, and the external jugular was very large. The patient had no fever, her temperature being only 100° .

With the tenderness in the neck, the optic neuritis, and the perfect well-being upon which she prided herself, a diagnosis of sinus thrombosis was established. The mastoid was hard; there was no cell, only a large antrum; the whole mastoid was eburnated, and the antrum was filled with cholesteatomatous material and pus. A perforation of the posterior wall of the antrum led to the sigmoid sulcus and allowed the pus to accumulate there. There being no cells, there was no tenderness, and mastoid disease was not suspected. The pulsation of the sinus was quite plain. The bony covering of the sinus was removed and a **perisinuous abscess** was found. The sinus was found to be plugged. Without removing the thrombus, the jugular vein was dissected, and was found to be completely obliterated. No plug was found in the jugular although the exploration was carried clear down to the clavicle. The whole jugular was obliterated from the angle of the jaw to the clavicle. The jugular was removed, and then the thrombosis, which extended into the lateral sinus about half way to the torcular. When all of the thrombus had been removed there was bleeding from above but none from below.

In looking over his hospital cases Dr. Gruening found that in all the instances where the jugular had been obliterated and the clot below could not be reached, the patients had died, and he naturally made an unfavorable prognosis in this case also.

Upon consultation with Dr. A. A. Berg, however, it was de-

cided that if the patient did not do well, the clavicle should be lifted and the jugular followed into the subclavian region, in order to try to reach the clot. *Fortunately, the patient recovered and is now up and about.* The operation was performed on the 17th of October, now three weeks ago. The patient has still about as much optic neuritis as at first, but this recedes very slowly and otherwise she is quite well.

Dr. HARRIS inquired what was the condition of the middle-ear, and also whether this procedure which was referred to had been done experimentally or clinically. He was entirely unacquainted with it.

Dr. LEWIS said that some time ago he had reported a case where the jugular was obliterated and the clot extended into the subclavian vein. The patient was in extremis at the time of the operation and died four hours following the operation. He was quite positive that the clot extended into the innominate vein and felt at the time that the operation was incomplete, but to go further would mean the death of the patient on the table. He had inquired of several surgeons as to the methods to be pursued in similar cases, but could not find one man who had ever gone down into the subclavian vein and explored and tied it.

Discussion on Dr. GRUENING's case of thrombosis of the lateral sinus and obliteration of the internal jugular.

Dr. H. W. BERG said that he did not know that he could add much to Dr. Gruening's extensive and special report, except for the interest that the case had for him from a diagnostic and general medical standpoint. He had seen the case but once in consultation outside the hospital. The attending physician had considered it a case of possible typhoid or cerebro-spinal meningitis; the latter possibility he based upon the fact that the patient lay in bed with a very rigid neck. However, Dr. Berg found the rigidity more like that of Pott's disease than spinal meningitis, both sides of the neck being held tense and rigid,—the patient keeping the back and side muscles of the neck intensely contracted to prevent the moving of the spinal column for fear of the pain resulting from such movements. The patient did not give Dr. Berg the impression of having typhoid fever, although the temperature curve was compatible with either typhoid or cerebro-spinal meningitis.

Upon examination of the mastoid Dr. Berg found no tender

ness or pain and no swelling ; however, in passing his finger over the side of the neck he found a rigid line extending from the front of the mastoid tip down to the clavicle, and it was upon this rigid line in the location of the jugular that he based his diagnosis of jugular phlebitis,—possibly an obliterating phlebitis, with the clot filling up the vein. The feeling was that which we obtain in an obliterating phlebitis, or a phlebo-sclerosis in any other part of the venous system. The most interesting feature was the hardness of the vein, and the readiness with which a diagnosis of thrombosis in the jugular vein could be made. The cerebral symptoms together with the septic temperature curve prompted the additional diagnosis of sinus thrombosis. He had been very fortunate in securing an immediate bed in the hospital for this patient, and prompt and careful operative treatment by Dr. Gruening, for without the aid and skill thus secured she would have died in a very short time of her septic sinus jugular thrombosis.

Dr. LEDERMAN said that he would like to know Dr. Gruening's method of the after-treating of the wound. A few years ago he had reported a case where the clot extended into the subclavian vein, and he had ligated the vein without resetting same, leaving the neck-wound open. A re-infection of the sinus toward the torcular occurred, rendering necessary other operations within ten days, but the patient recovered, although the infections were very severe. At one time the temperature was as high as 106°, with repeated chills.

In this instance the region of the jugular bulb had been exposed and thoroughly cleansed. The internal jugular vein was much contracted and difficult to find. The speaker desired to learn if any of the gentlemen present had employed the method of Ballance, *i. e.*, in bringing the remaining portion of the jugular vein out of the upper part of the neck wound, and permitting drainage externally, the remaining portion of the wound being sutured.

Dr. RICHARDS said that he understood Dr. Gruening to say that while the sigmoid sinus and jugular bulb were blocked, the jugular vein was collapsed, though it contained no thrombus. This class of cases had been of particular interest to him because the clinical phenomenon of collapse of the jugular without thrombosis threw considerable light upon the excursion made by the jugular during the respiratory act, *i. e.*, the manner in which

the vein is filled and emptied. To appreciate the conditions causing collapse in these cases, we must consider certain hydraulic factors which influence the sinus system.

The question first arises: "Why, with the jugular and its branches unobstructed by thrombi, is there no blood-flow through these vessels?" The mere condition of jugular collapse argues that the side tributaries to the jugular exert little primary influence in opening or keeping open this vessel after inspiration has obliterated its lumen. How, then, does the vein open, as through the tenuity of its walls it is incapable of opening itself? In the architectural arrangement of the bulb we find the mechanism which is largely responsible for the act. First the upper portion of the jugular is capped by a "cornucopia" with its base held up as a receiving cup to the jugular bulb. The incollapsible character of this funnel, together with the fact that its apex is directed into the upper end of the jugular, allows the stream of blood from above to impinge against the collapsed tube, "end on." The columns of blood to the side tributaries to the jugular enter at disadvantageous angles and impinge upon a collapsed tube, which acts as a "bumper." This blood can gain no entrance until the jugular has been opened or "inflated," so to speak, by the current from above.

A second factor which renders the cornucopia which caps the jugular a highly efficient mechanism is the current of the inferior petrosal sinus which enters on its inner wall and shoots its current directly into the apex of the funnel. The current of the inferior petrosal is a positive factor in prying open the collapsed upper end of the vein upon the end of the inspiratory act.

At the same time that the jugular is being opened from above downward through the influence mentioned, it is also being opened from below upward by blood regurgitating from the deep portion of the jugular in the neck. The valve in the lower portion of the jugular, as has been demonstrated upon recent cadavers, does not completely prevent regurgitation, but allows of a physiological regurgitation, as do certain heart valves. The wave opening the jugular from below upward meets the wave coming from above downward, and as the respective waves open the collapsed vein, and as the points of entrance of the side tributaries are passed, these latter vessels then, and not until then, pour in their volumes to the best advantage.

When, therefore, through thrombosis, the jugular bulb and the

inferior petrosal sinus become blocked and the "funnel" action of the cornucopia abolished, we have the clinical phenomenon of collapse of the jugular without thrombosis. The side tributaries not infrequently partake of this collapse. I have seen the facial obliterated for some distance from the jugular. It will be found, as a rule, in these cases that the collapse of the jugular extends down to the highest point reached by the regurgitated wave from below. Given the element of time, the collapsed walls of the vein eventually become sealed and pass into the condition of a cord.

The obliteration of the jugular tree through the above influences is in reality a beneficial outcome, as the general collapse tends to block sepsis from the system. The conditions, however, which bring about collapse, suggest extreme invasion—that not only the bulb is blocked, but that the by-paths to the bulb are blocked also, avenues surgically inaccessible. It is for this reason that not only the mortality is high, but that death is due, as a rule, not to general sepsis, but to meningitis or some other intracranial complication.

Dr. GRUENING, in closing the discussion, replied to Dr. Harris's question by stating that Grunert proposed the operation of sawing through the clavicle. In some cases he has been able to remove the clot. If this case had not done well he would have resorted to this method. It has been practically tried and found useful.

In response to Dr. Lederman's inquiry, Dr. Gruening said that there was a large infected area from the clavicle to the bulb, and in order to drain thoroughly he left the wound open and packed it with iodoform gauze.

The lumen had become closed, but there was no thrombus in the vein, and the same condition prevailed in the facial vein, which had also collapsed. The condition went much farther than the clavicle.

He had been very agreeably surprised at the favorable outcome of the case. The girl had a fever for a few days, but that was due to a local abscess. On introducing the dressing forceps into the region of the bulb a tablespoonful of pus escaped, but after that the recovery of the patient was uneventful. In future he would be more ready to look for good results in these cases.

REPORT OF THE TRANSACTIONS OF THE NEW YORK OTOLOGICAL SOCIETY.

BY DR. THOMAS J. HARRIS, SECRETARY.

MEETING OF NOVEMBER 27, 1906.

Dr. DUEL reported a fatal case of **cerebellar abscess** and exhibited the brain. The patient was a woman, who came to the hospital with a history of chronic middle-ear disease, and complained of pain in the right side of the head. There was a fetid discharge in the right ear. No tenderness shown over the mastoid. Operation was refused, and she left the hospital. Two days later she was admitted in a semi-comatose condition. Morphine had been administered by some physician outside. When seen by Dr. Duel there were slow respirations, narrow pupils, a pulse of 60, and a subnormal temperature. The patient died two hours later. The autopsy showed an abscess of the right lateral lobe of the cerebellum. Infection had taken place from the wall of the lateral sinus. There was no clot in the sinus, but it was bathed in pus.

Dr. HARRIS inquired as to the condition of the inner ear. All recent authorities lay stress on the frequency with which cerebellar abscess is found associated with disease of the inner ear.

The CHAIRMAN referred to the statement of Mr. Ballance at the recent meeting of the American Medical Association that cerebellar abscess was about twice as frequent as cerebral abscess. His statistics were quite different. In thirteen cases reported, it was three to one in favor of cerebral abscess.

Dr. GRUENING showed the clamps used by Jansen for closing the mastoid wound. These were not new, but had never been used by him till this fall. He now employed them with much satisfaction.

Discussion.—Dr. DUEL said that he had used them, but that his experience was not so pleasing.

Dr. LUTZ presented photographs of cabinets used by him in his office.

Dr. MCKERNON reported a case of **accidental wounding of the internal carotid artery** in the course of a Schwartze-Stacke operation. The patient was a child of fourteen, who suffered from chronic middle-ear disease and mastoiditis. The usual incision was made and the mastoid was found broken down. The operation was completed, except cleaning out the mouth of the Eustachian tube. A sharp curette (used on account of the amount and character of the bone) was introduced, and several pieces of bone removed. Suddenly it was felt to break through the anterior wall. There followed immediately an alarming flow of blood. This was checked by firm tamponing; no recurrence of the bleeding when the dressing was removed on the fifth day. The hemorrhage undoubtedly was from the internal carotid artery.

Discussion.—Dr. GRUENING stated he was in the habit of using a dull ring curette, which he thought was safer.

The CHAIRMAN thought that the direction of the curette, always anteriorly and above, was the safe one. He referred to a case where he had wounded the jugular bulb in the course of a radical operation. Pressure controlled the copious bleeding. Recovery was uneventful. The abnormal position of the bulb had been suspected from a slight elevation on the floor of the canal.

Dr. DUEL reported a case of **mastoiditis** and **perisinuous abscess** complicated by the presence of sugar and albumen in the urine. These both cleared up after the operation. The question suggested itself whether the sugar was due to excessive intracranial pressure.

Discussion.—Dr. GRUENING thought sugar was always an unfavorable symptom; most of his cases died.

Dr. QUINLAN reported that he had operated during the past six years on four cases of **acute mastoiditis** that was complicated with diabetes: Two male adults, forty-five and thirty-seven; one young girl, fifteen; one woman, sixty-five. Chloroform used in all cases. Recovery followed without serious complication.

Dr. GRUENING thought that when the bone alone was in-

volved, and not the soft parts, the prognosis following operation was better. He raised the question whether the presence of sugar should not always make us hesitate to operate.

The CHAIRMAN thought that the presence of diabetes did not warrant delay in a necessary operation.

Dr. SHEPPARD had had four cases, two of which recovered, though the wound was slow in healing. The third case died as a result not of the diabetes but from infection. The fourth case, one of acute middle-ear suppuration following bathing, showed no sugar at the time of the operation, but a specific gravity of 1.034. Immediately after the operation, however, the urine showed a large amount of sugar. The operation revealed a large cavity in the mastoid, but a healthy sinus. The patient did well for five or six days, but later developed a general septicæmia and died. Dr. Sheppard agreed with Dr. Gruening that diabetes was distinctly an unfavorable symptom, and operation should be undertaken with deliberation.

Dr. MCKERNON had seen six such cases in the past three (3) years, two died of diabetic coma within forty-eight hours after the operation. One of the fatal cases had been under close observation for some time, and operation was only decided upon as the lesser of two evils.

The CHAIRMAN spoke of a case of his where recovery had taken place even after erysipelas had developed.

Dr. DUEL reported a case of **exposure of an anomalous facial nerve** in the course of an operation upon a diploic mastoid. The nerve was uncovered for a space of a quarter of an inch without any injury resulting, though it was touched, and the facial muscles responded vigorously several times. The cells in front of and internal to the nerve were full of pus.

Discussion.—Dr. TOEPLITZ referred to the possibility of wounding the nerve in an operation for acute mastoiditis. He had heretofore thought that this was not possible, but he had recently seen such a case.

Dr. BERENS spoke of having had a similar case.

Dr. QUINLAN referred to a case of **chronic suppuration** operated on about five weeks ago, in which a facial paralysis developed on the third day after operation. Paralysis slightly improving at present, but still in evidence when patient laughs or attempts to whistle.

The CHAIRMAN stated that this might occur as late as the

fifth day. It was due either to pressure from the packing or to infection. They always got well.

Dr. SHEPPARD asked if pre-operative paralysis was a particular indication for operation. He had seen several such cases which had promptly recovered.

The CHAIRMAN said one of his worst cases of facial paralysis had developed without any twitching of the face during the operation.

Dr. GRUENING thought that it was important not to cover the face too much. He does not rely upon the anæsthesist to watch the face.

Dr. KENEFICK inquired if in the experience of those present any one had succeeded by the radical operation in clearing up a facial paralysis of long standing and dependent upon the purulent disease of the ear.

The CHAIRMAN had seen one such case where recovery took place several months after the operation. At the time of the operation there was no response in the nerve to any mechanical stimuli. The paralysis developed two years before the operation as a result of an operation for acute mastoiditis in the hands of another surgeon.

Dr. BRYANT reported a case of **oto-cerebellar abscess** seen in consultation. Child five years old; operation—mastoid cells opened for fetid otorrhœa with mastoid tenderness and high temperature. Sixth day—daily temperature reaches 105° , stupor, temporo-sphenoidal lobe explored, nothing found. Twelfth day—seen in consultation, slight nystagmus, temperature ranging high, some rigidity of neck, stupor, foul purulent discharge and necrosis of wound. No sign of sinus thrombosis. Fifteenth day—opened a thrombosed suppurative sigmoid sinus and internal to it a very large necrotic cerebellar abscess. A slight remission of symptoms. At the subsequent dressings a considerable amount of dark, foul necrosed detritus was evacuated from the cerebellum, followed by flow of 1 to 3 drams of clear cerebro-spinal fluid. Twenty-first day—death. Autopsy findings—Weight of brain 1080 grams. Brain is injected on cortex. At base covered with thick, yellow pus, and fibrin. The portions of the brain lying next the mastoid operation opening are deficient and necrotic, covered with pus, and an abscess cavity large enough to admit two fingers extends laterally through left lobe of cerebellum, across the commissure (where it is separated

by a thin lamina only, if at all, from the fourth ventricle) and half way into right lobe. All ventricles are distended, with thin layer of pus on walls. The condition of the sinuses not attacked at the operation seems good.

Dr. GRUENING had seen fluid follow in a case of temporo-sphenoidal abscess where recovery had taken place.

Dr. GORHAM BACON reported the following case: Patient seen in consultation who gave the following history: Three years ago he complained of deafness and a ringing noise in both ears, with slight attacks of dizziness and vomiting at the onset of each attack. Bone-conduction was decidedly defective in both ears. He contracted syphilis ten years ago. Blisters were applied over each mastoid and he was given increasing doses of iodide of potash. Later hypodermic injections of pilocarpine were given in sufficiently large doses to produce the therapeutic effect. He improved under this treatment and the Doctor did not see him again until the past summer when he again complained of most violent attacks of dizziness with vomiting. The hearing for the watch was completely gone and the bone-conduction very much diminished. For three months he was placed on inunctions of mercury with some improvement, until quite recently when he became much worse again. When I saw him on November 22d he was very much depressed in mind and there was no question of involvement of the labyrinth on each side. The bone conduction was practically gone. I advised continuing the inunctions over each mastoid, and commencing again the hypodermic injections of pilocarpine.

I report this case to find out the views of the members of the Society as to the value of **pilocarpine in cases of syphilitic deafness**. According to my experience we should use this remedy as soon as possible after deafness comes on in order to obtain the best results.

Discussion.—Dr. WILSON had seen the ear become involved in syphilis where the patient had been taking mercury and iodides for a year and a half.

Dr. BERENS felt that only when enormous doses were given would we get good results. He gives as high as 480 grains a day in peptonized milk one hour before meals, thus not to upset the stomach.

Dr. QUINLAN reported a case of deafness with vertigo and

tinnitus of seven years' standing that was improved by hypodermic injections of pilocarpine. The dose was started at $\frac{1}{12}$ and increased until $\frac{1}{4}$ was reached. Patient relieved of vertigo and subjective noises improved as well as hearing.

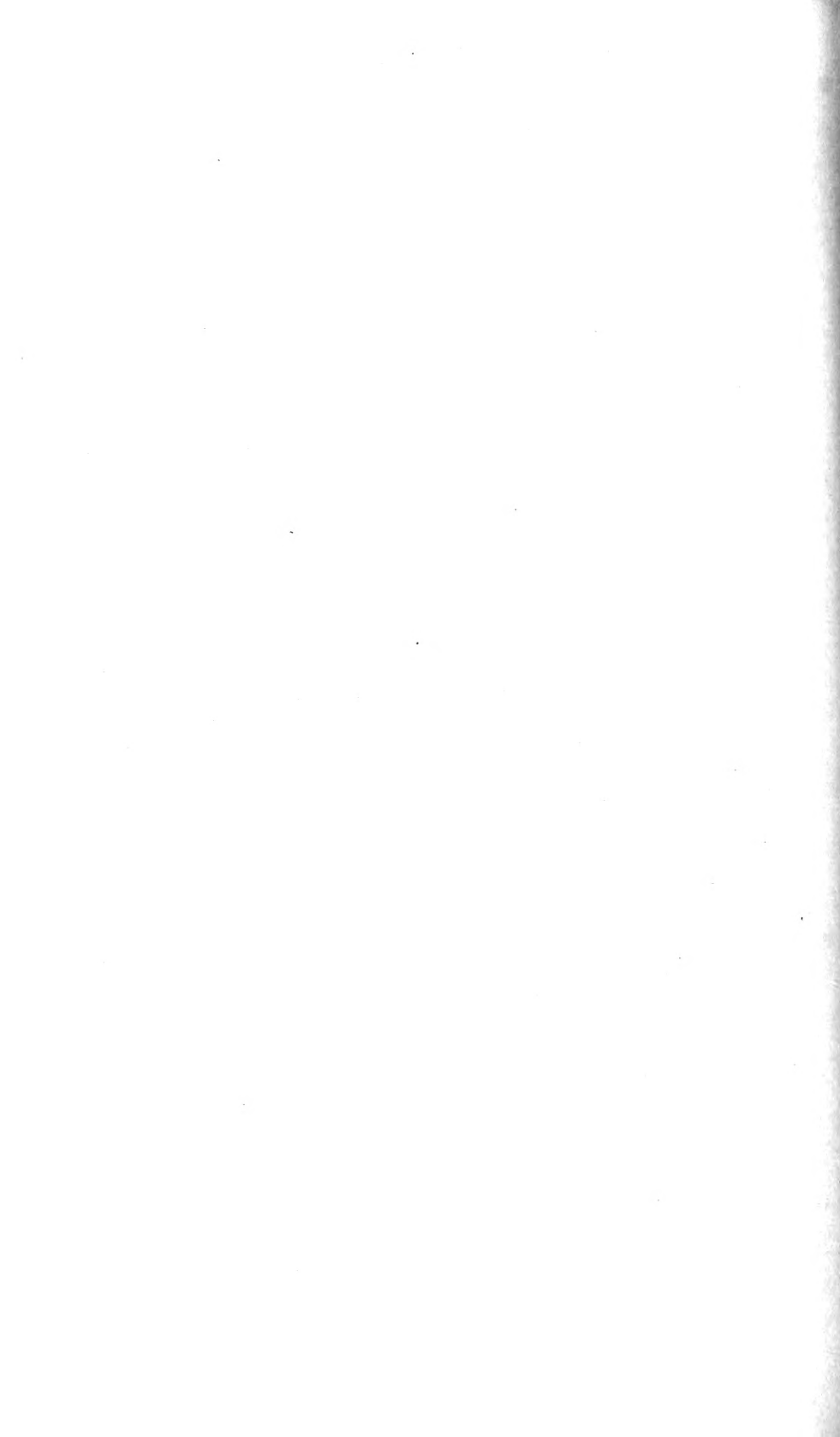
Dr. EMERSON's experience was that in congenital syphilis the iodides in large doses do harm, while in acquired syphilis they do good.

Dr. HARRIS referred to a case under his care at present where pilocarpine administered in $\frac{1}{4}$ grain doses had been of great benefit. The interesting feature of the case was that sexual intercourse always brought back the deafness.

Dr. GRUENING was in the habit of giving it by the mouth at bedtime in a cup of tea. He gave only enough of the drug to secure sweating. Salivation was a favorable symptom from it, in cases of acute labyrinthine deafness.

Dr. BERENS dwelt upon the importance of free absorption of the iodides. To secure this, he was wont to order Turkish baths to open pores of the skin, and administered the iodides upon an empty stomach.

The CHAIRMAN was of the opinion that in such cases both the iodides and pilocarpine should be given.



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